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Project Purpose and Need, Alternatives, and Proposed Action

The Airside Improvements Planning Project (Airside Project) is intended to reduce existing and future delay and enhance airfield safety at Logan International Airport in Boston, Massachusetts. Elements of the Proposed Action include: a new unidirectional Runway 14/32; a new Centerfield Taxiway; improvements to Taxiways Delta and November and to taxiways in the Southwest Corner of the airfield; and a reduction in approach minimums on Runways 22L, 27, 15R and 33L.[1] This chapter describes the purpose and need for the Airside Project, the Alternatives considered, and the elements of the Preferred Alternative. It also provides a list of permits that may be required for the Preferred Alternative.

1.1 Purpose and Need

In recent years the air transportation industry has suffered from record numbers of flight delays creating unnecessary economic costs, contributing to environmental impacts, and inconveniencing air travelers. According to the U.S. Department of Transportation (U.S. DOT), 27.4 percent of airline flight arrivals in 2000 were delayed by more than 15 minutes, and Logan was one of the most delayed airports in the nation.[2] Similarly, FAA data shows that Logan was the 6th worst U.S. airport in terms of total delays and the 2nd most delayed airport for arriving flights.[3]

Prior to September 11, 2001, the nation's delay problem was so severe that it threatened the nation's long-term productivity and economic growth. At that time the U.S. Secretary of Transportation stated, "One of the greatest challenges faced by the Department of Transportation, the FAA and the commercial aviation industry is to close the gap between demand for air transportation and the capacity of our current infrastructure."[4] While the events of September 11th, 2001 have resulted in a decrease in passenger demand and operations and therefore a suspension of certain delay conditions, FAA believes that the situation is temporary. The FAA's Commercial Aviation Forecasts released in March 2002

1 Inherent in these improvements is the establishment or modification of air traffic control procedures and attendant airport navigational aids.
2 U.S. DOT, Air Travel Consumer Report, December 2000.
3 FAA, 2000 OPSNET data. (See Section 1.4.1)
4 U.S. Secretary of Transportation Norman Y. Mineta, Remarks before the U.S. Chamber of Commerce, February 2, 2001.

project that US air passenger traffic will undergo a strong recovery in 2003 and will continue to expand, reaching 1 billion annual passengers by 2013.

The Airside Project identifies physical improvements and actions that address very specific causes of delay at Logan Airport. The improvement concepts evaluated in the Airside Project Draft EIS Documents are summarized in Table 1.1-1 and described in more detail in Sections 1.7 and 1.8 of this Final EIS. Proposed airside improvement concepts are designed to improve Logan's operating efficiency, enhance safety, and reduce current and projected runway and taxiway delays.

Table 1.1-1
Purpose of Airside Improvement Concepts

Improvement Concept	Purpose
Construct Unidirectional Runway 14/32	Reduce Northwest Wind Delays
Peak Period Pricing	Reduce Overscheduling Delays
Construct Centerfield Taxiway	Reduce Taxiway Delays, Enhance Safety
Extend Taxiway Delta	Reduce Taxiway Delays, Enhance Safety
Realign Taxiway November	Simplify Taxiway System, Enhance Safety
Optimize Southwest Corner Taxiways	Reduce Taxiway Delays, Enhance Safety
Reduce Approach Minimums on Runways 22L, 27, 15R and 33L	Enhance Safety and Reliability

As the gateway to New England, Logan plays a vital role in the region's economic prosperity by ensuring fast and efficient access to the global marketplace. Delays at Logan cause an estimated $300 million in unnecessary costs to airlines and air passengers annually. In 2000, Logan accommodated 27.4 million passengers, representing more than 60 percent of all New England air passengers. Logan is the 18th busiest U.S. airport based on passenger volume and the 11th busiest based on aircraft operations (arrivals and departures).[5] The aircraft delays that plague Logan hamper the airport's ability to provide efficient and reliable access to national and world markets and threatens the region's long-term economic success.

The analysis in the Airside Project EIS Documents demonstrates that a large portion of the aircraft delays at Logan are avoidable and can be eliminated by correcting a limitation in the airport's existing runway layout. Approximately one-fourth of the annual aircraft delays at Logan occur during periods of northwest winds. While certain causes of delay, such as inclement weather, cannot be eliminated, Massport as airport proprietor and FAA through Airport Layout Plan (ALP) review and federal funding can act to reduce delays that occur in northwest wind conditions by improving Logan's airfield layout.

Most often, Logan is able to operate on three-runway configurations that can accommodate approximately 120 operations per hour. However, moderate to high northwest winds can

5 Airports Council International, *Worldwide Airport Traffic Report,* July 2000.

restrict the airport to low-capacity configurations with two or fewer runways that accommodate only 60 to 90 operations per hour. When these configurations are in use, Logan cannot accommodate normal levels of demand without incurring serious delays. Even in the depressed environment following September 11, 2001, Logan requires three runways to operate efficiently during peak periods.

The proposed unidirectional Runway 14/32 is designed to increase the reliability of Logan Airport by preventing the decline in capacity that occurs during northwest winds. By allowing Logan to maintain its normal operating capacity, Runway 14/32 would significantly reduce these preventable delays.

Delays at Logan can also accrue when airlines schedule beyond the airport's normal runway capacity (approximately 120 operations per hour). In the early 1990s, airline overscheduling was a significant source of flight delays at Logan. At that time, Massport seriously considered establishing a peak period pricing program to eliminate airline overscheduling and related flight delays. However, overscheduling subsided when one of Logan's three major regional airlines ceased operations, producing an immediate reduction in flight volume.

While Logan does not currently suffer from airline overscheduling, Massport recognizes that overscheduling conditions could re-emerge in the future and exacerbate Logan's delay problem. For this reason the EIS analysis considers potential future scenarios that are characterized by overscheduling in order to assess the benefits and impacts of demand management actions to reduce delays related to overscheduling. These forecasts represent a realistic outer range of unconstrained activity and provide a conservative upper bound for environmental impacts under the No Action Alternative. The Airside Project analysis evaluates Peak Period Pricing as a demand management tool for reducing overscheduling delays (see Section 4.4 of the Draft EIS/EIR and Section 4.5 of Supplemental DEIS/FEIR), and the delay reduction and environmental impacts of demand management can only be assessed through comparison to an unconstrained No Action Alternative. The analysis indicates that Peak Period Pricing would be effective in reducing delays that occur when scheduled demand exceeds airfield capacity for a sustained period of time. As a result Massport has committed in its Section 61 Findings, pursuant to the Massachusetts Environmental Policy Act, to implement peak period pricing, or an alternative demand management program with comparable effectiveness.

In addition to improvements that are designed to relieve runway-related delays, Massport and the FAA examined potential improvements to Logan's complex taxiway system. The proposed taxiway improvements would increase airfield efficiency and decrease taxiway delays by simplifying the existing taxiway system. The taxiway improvements would also enhance safety by reducing the risk of runway incursions.[6] The Centerfield Taxiway is a key component of the taxiway improvements, and it can reduce taxiway delay and enhance safety as described in Section 3.9 of this Final EIS.

6 In the context of taxiing aircraft, a runway incursion typically occurs when safe separation standards are violated by a taxiing aircraft that moves onto or across an active runway at a time when an arriving or departing aircraft is intending to use that runway.

Table 1.1-2 summarizes the combinations of improvement concepts, or "project alternatives," that were evaluated under five future fleet scenarios in the Airside Project Draft EIS/EIR. The Supplemental DEIS/FEIR analyzes an additional long-term 37.5M High Regional Jet (RJ) fleet for all Project Alternatives in order to assess the impact of the rapid growth of regional jet aircraft at Logan. Also, Appendices C, E, and F of the Supplemental DEIS/FEIR contain the operational and environmental results for the full set of Alternatives that were described in detail in the Airside Project Draft EIS/EIR. This Final EIS introduces a new, near-term 29M RJ Fleet to assess the near-term impacts of a Logan fleet with more regional jets than the near-term fleets that were analyzed in the Draft EIS/EIR.

Table 1.1-2
Logan Airside Improvements Alternative Packages

	Alternative 1	Alternative 1A*	Alternative 2	Alternative 3	Alternative 4
	All Actions	All Actions Except Peak Period Pricing	All Actions Except Runway 14/32	No Build	No Action
IMPROVEMENT CONCEPT		PREFERRED ALTERNATIVE			NO ACTION ALTERNATIVE
Runway 14/32	■	■			
Taxiways:					
Centerfield	■	■	■		
Extend Delta	■	■	■		
Realign November	■	■	■		
South West Corner Optimization	■	■	■		
Operational:					
Reduced Minimums	■	■	■	■	
Administrative:					
Peak Period Pricing	■		■	■	

* Peak Period Pricing or an alternative demand management program with comparable effectiveness is part of the mitigation program for the Preferred Alternative.

After careful review in the Airside Project Draft EIS/EIR of the extent and causes of delays at Logan and the comparative operational benefits and environmental impacts of each alternative, Alternative 1A was selected as the Preferred Alternative because it would significantly reduce delay without imposing the economic costs associated with Peak Period Pricing on regional carriers and New England communities. While the EIS analysis indicates that demand management would provide significant benefits in the long-term when airline overscheduling exists, it would not be an effective near-term solution to Logan's delay problem. In contrast, Runway 14/32 reduces delays due to northwest winds under historic, current and future scenarios, and its delay reduction benefits are not dependent upon long-term growth in operations. Additionally, the Preferred Alternative would achieve certain environmental benefits, including improved air quality and reduced noise exposure for the most severely affected communities, while causing minimal environmental impacts, all of which would be mitigated. Chapter 8 of the Draft EIS/EIR fully describes the basis for the selection of the Preferred Alternative.

Section 1.2 to Section 1.6, which follow, provide additional background information that is relevant to the Project Purpose and Need.

1.2 How Logan Operates

Airfield capacity is a function of airport design (the number and direction of runways and taxiways, runway instrumentation, etc.), weather conditions (visibility and wind direction), aircraft mix (heavy, large, small), and FAA Air Traffic Control (ATC) procedures that govern the sequencing and spacing of aircraft. Thus, even for a given airfield layout, capacity is a dynamic factor that varies with changes in wind direction, weather conditions and the mix of arriving and departing aircraft.

1.2.1 The Airfield Layout

Logan's airfield layout, illustrated in Figure 1.2-1, consists of five runways, which vary in length from 2,557 feet to 10,081 feet.[7] Logan's runways are aligned in three directions with runway ends pointing toward six distinct compass headings. Aircraft must generally takeoff and land into the wind, so the availability of specific runway configurations is determined by wind speed and direction, and other weather conditions. The runway layout provides necessary operating flexibility given Logan's coastal location and highly variable wind conditions. Non-coastal airports that do not experience the same variation in wind conditions may have a simpler airfield layout and fewer required operating configurations.

1.2.2 Runway Use Configurations

While Logan has five runways, typically no more than three runways can be used concurrently. Delays occur when only low capacity configurations (i.e., less than three active runways) are available and flight demand exceeds available capacity. To operate efficiently under all wind directions, Logan requires three active runways for most of the operating day.

There are several primary runway configurations in use at Logan, with over 80 operating subsets of these configurations. As described in the Airside Project Draft EIS/EIR, the operational capacities of Logan's existing configurations range from a maximum of approximately 120 operations per hour when the weather is good, winds are light, and three runways are available, to fewer than 60 hourly operations for a single runway.

Logan's highest capacity configurations have three active runways which allow FAA controllers to segregate arriving aircraft of different size classes into two arrival streams and to use the third runway for aircraft departures. High capacity runway configurations are available at Logan nearly 80 percent of the year. For the remaining part of the year,

7 Logan's shortest runway, Runway 15L/33R, has very limited utilization and can only be used by the smallest-sized aircraft, e.g., Cessna 402s with 9 seats.

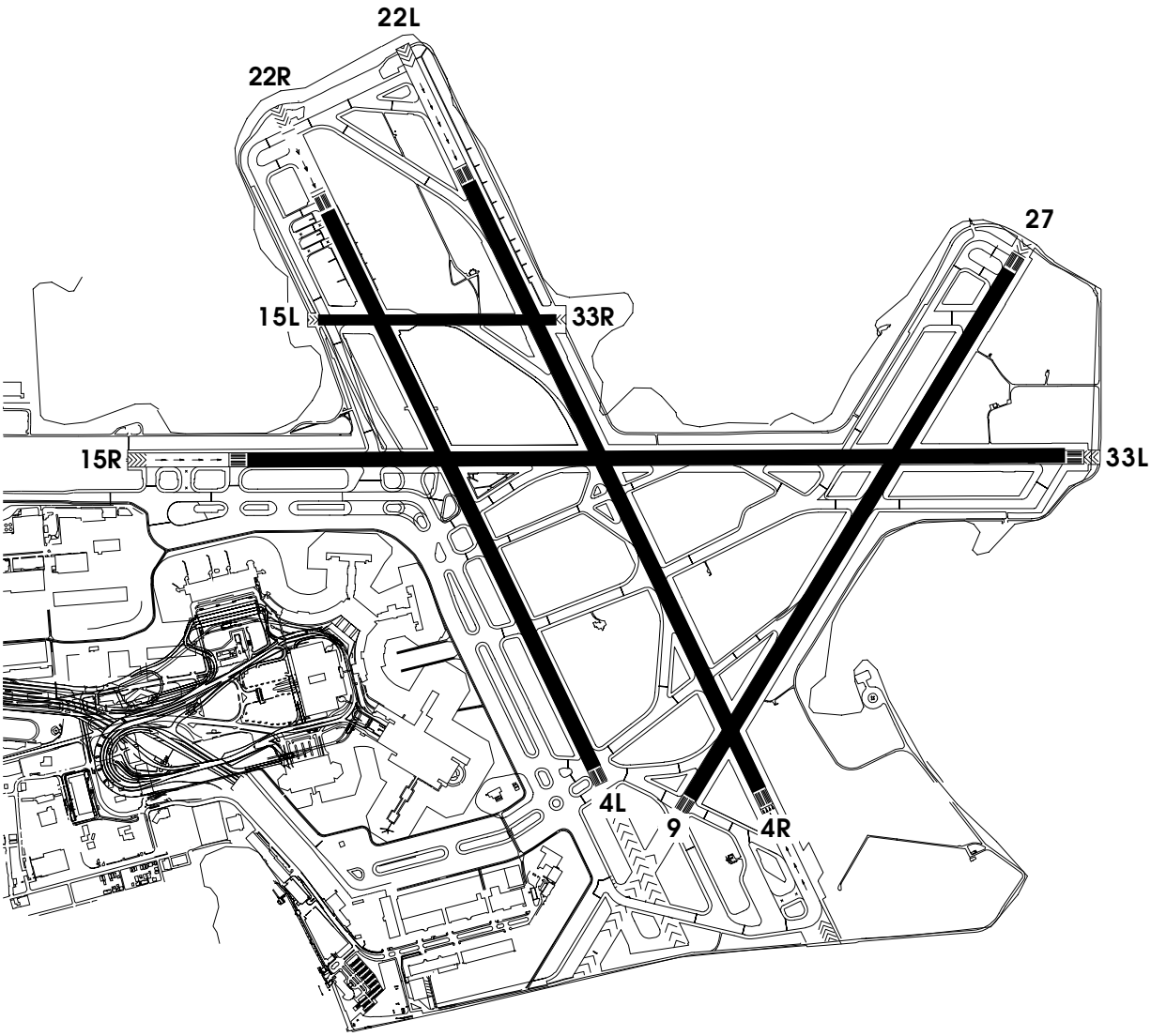
poor wind and weather conditions restrict the airport to low capacity configurations with just one or two available runways.

As shown in Figures 1.2-2 to 1.2-3, the north-south configurations are the highest capacity configurations at Logan. These configurations include the Runways 4L, 4R, and 9 configuration and the Runways 22L, 22R, and 27 configuration. With three available runways, these configurations maximize the airport's operating efficiency by providing two runways for arriving aircraft, which permits air traffic control to segregate aircraft of different size classes. Conversely, when the airport is restricted to a two-runway or one-runway configuration with a single arrival stream, airfield capacity drops significantly. As shown in Figures 1.2-4 to 1.2-6, Logan is restricted to two or one runway when operating in an east/west orientation. These low capacity configurations include the east/southeast configuration of Runways 15R and 9, and the west/northwest configuration using Runways 27 and 33L. Under high northwest winds, Logan can be restricted to just a single runway, Runway 33L, to handle all arriving and departing aircraft.

Because Logan lacks a third available runway in the east-west direction and Runway 15L/33R is too short to be used by most aircraft, the north-south runway configurations are utilized most frequently (see Figure 1.2-7). In 1998, 76 percent of Logan's jet operations landed on or departed from the north/south runway configurations (Runways 4L and 4R arrivals, 4R departures, Runway 9 departures, 22L and 22R departures, and 22L and 27 arrivals). As a result, communities affected by the north/south runway configurations bear a disproportionate share of jet overflights. Conversely, 11 percent of Logan's 1998 jet operations were on runways affecting communities west of the airport (Runway 27 and 33L departures, and 15R arrivals) and 13 percent utilized over-the-water runways (15R for departures and 33L for arrivals).

If no action is taken to correct this limitation in the airfield layout, Logan's dependence on north-south runways will increase over time and could exceed 90 percent under the 37.5M High Fleet[8] scenario. By constructing proposed Runway 14/32, Logan's dependence on north-south configurations could decline compared to the future No Action scenario. With a third runway available in the east-west operating direction, the Preferred Alternative allows for a more balanced geographic distribution of jet overflights compared to the No Action Alternative.

8 The High Fleet assumes a greater proportion of non-jet aircraft and thus a higher level of total operations for the same passenger level than the Low Fleet, which assumes more large jet operations than non-jet operations, similar to current conditions.



RUNWAY LENGTH DATA (feet)

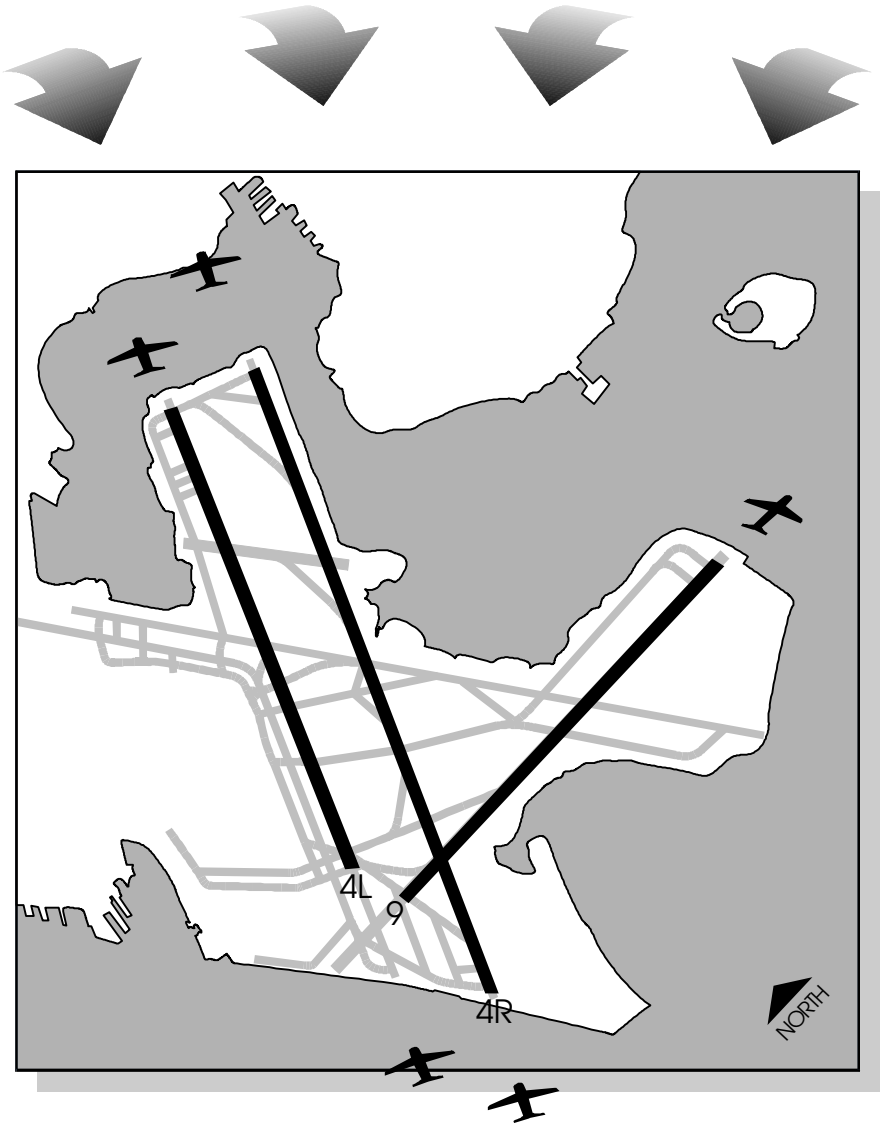
Runway	Landing Length	Take off Length	Displaced Treshold
15R	9,201	10,081	880
33L	10,081	10,081	_
4R	8,850	10,005	1,155
22L	8,806	10,005	1,199
4L	7,860	7,860	_
22R	7,045	7,860	815
9	7,000	7,000	_
27	7,000	7,000	_
15L	2,557	2,557	_
33R	2,557	2,557	_

massport

Figure 1.2-1

Existing Logan Airport Runway Layout

Three-Runway Configuration



LEGEND

Wind Direction

Figure 1.2-2

Northeast Wind Configuration Using Runway 4L, Runway 4R and Runway 9

07466-FIG-1.2-2.p65

Three-Runway Configuration

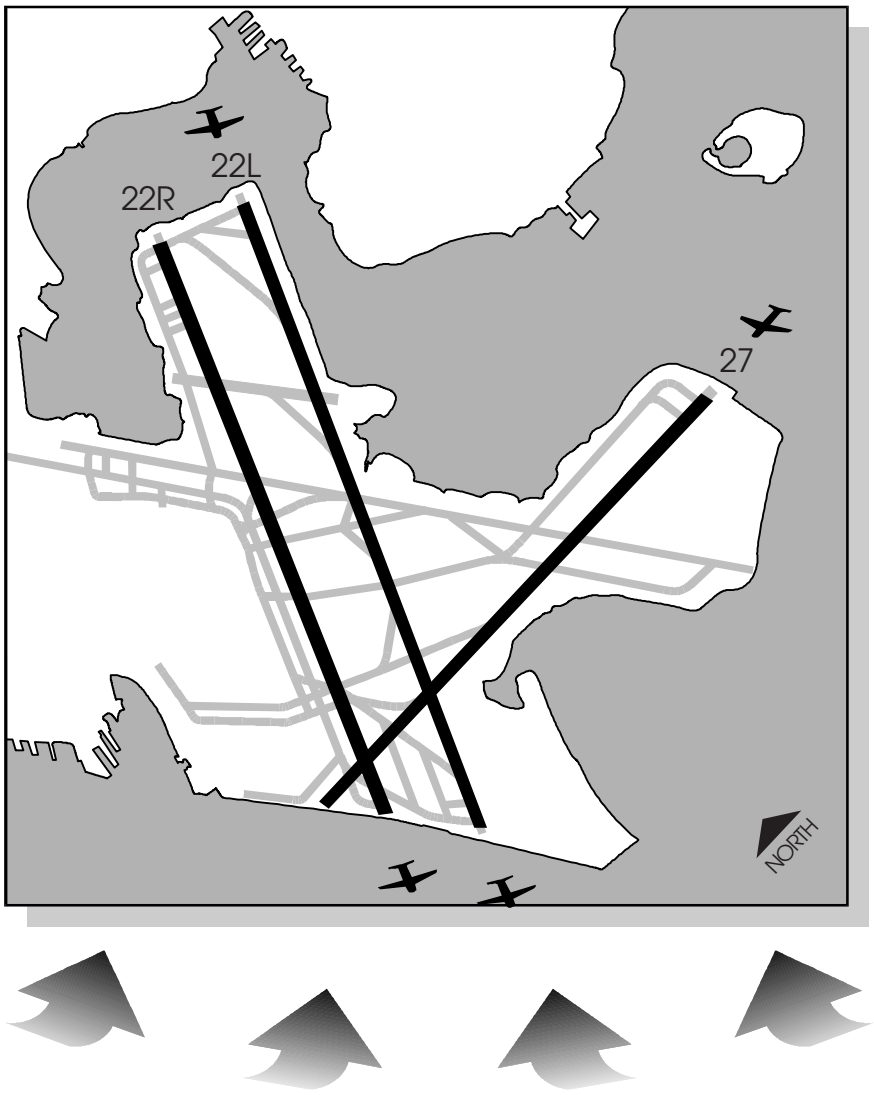
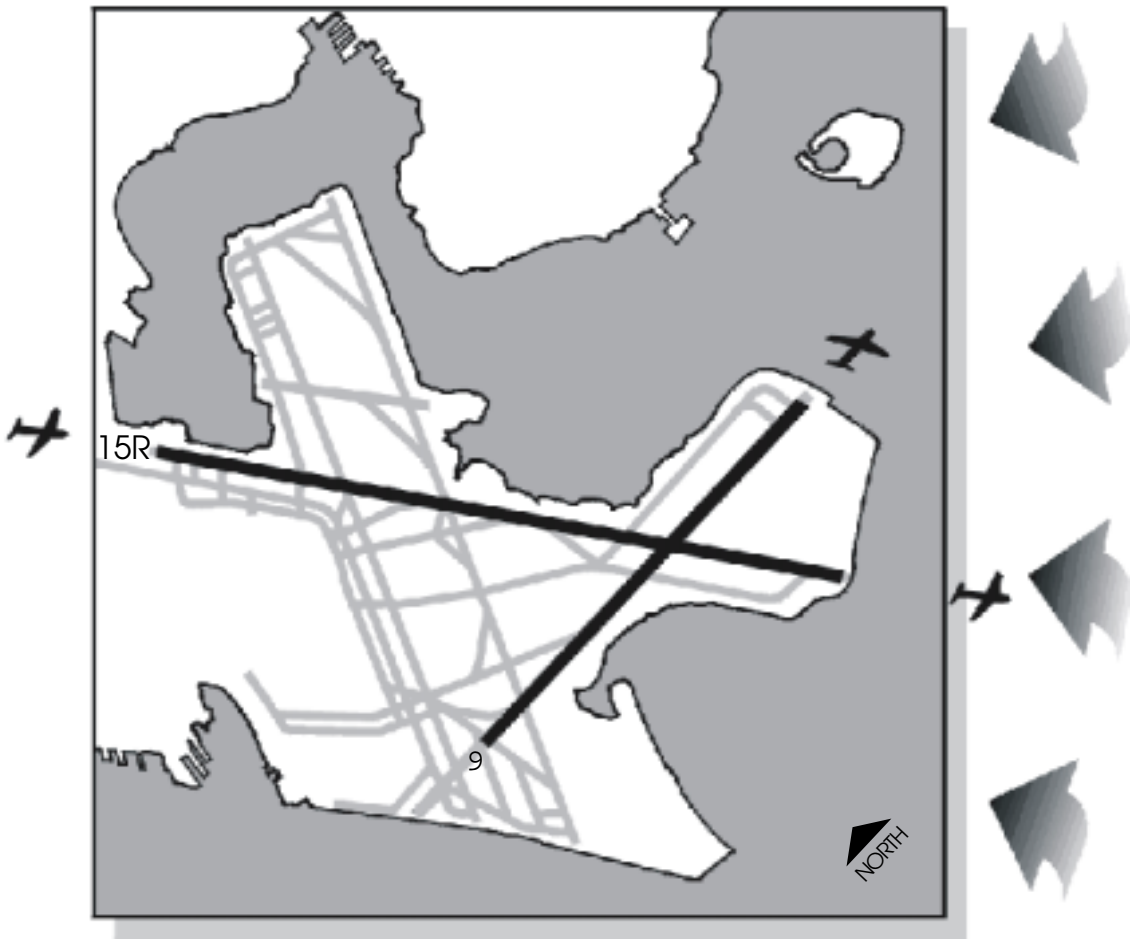


Figure 1.2-3
Southwest Wind Configuration Using Runway 22L, Runway 22R and Runway 27

7466-FIG-1.2-3.p65

Two-Runway Configuration



LEGEND

Wind Direction

NOTE

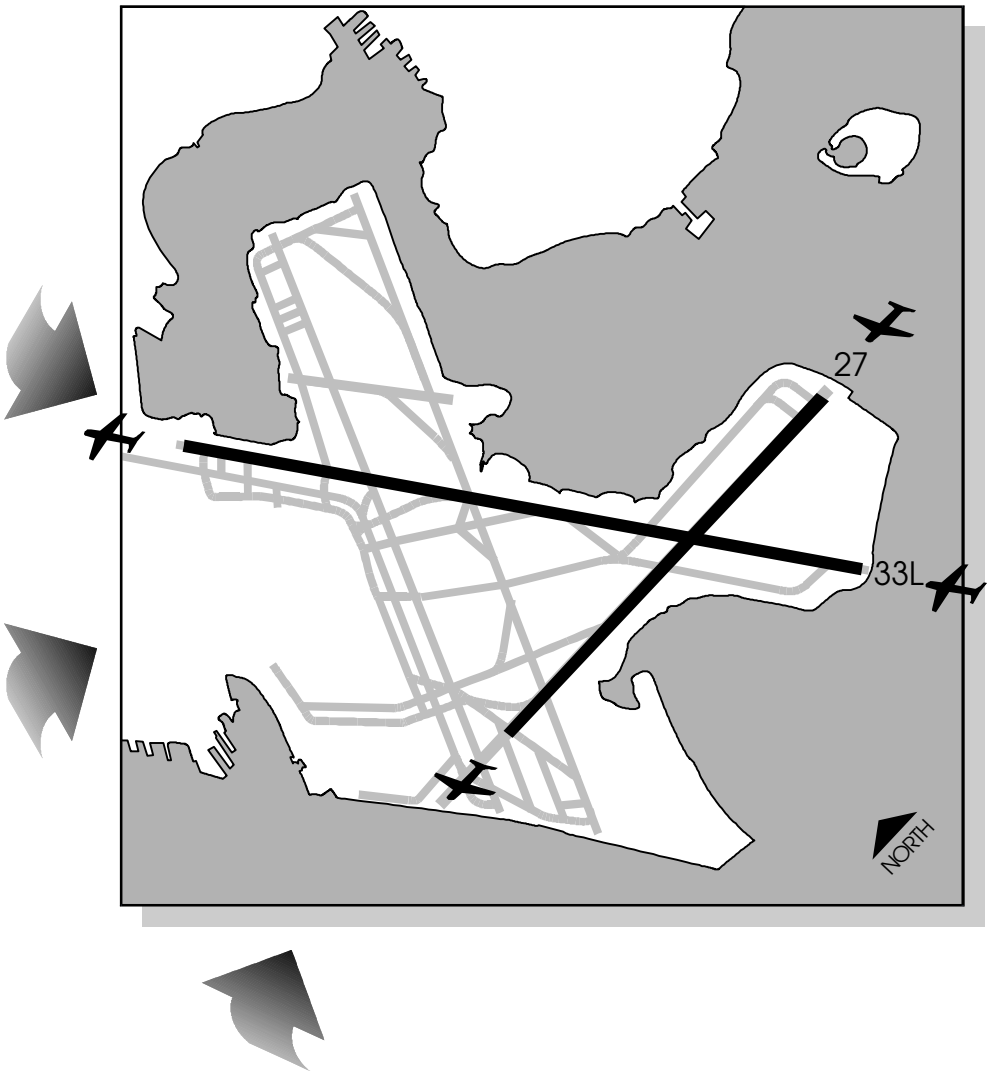
Runway 15L only used for arrivals by smalll planes, such as the 9-pasenger Cessna used by Cape Air.

Figure 1.2-4

East/Southeast Wind Configuration Using Runway 15R, Runway 15L and Runway 9

7466-FIG-1.2-4.p65

Two-Runway Configuration



LEGEND

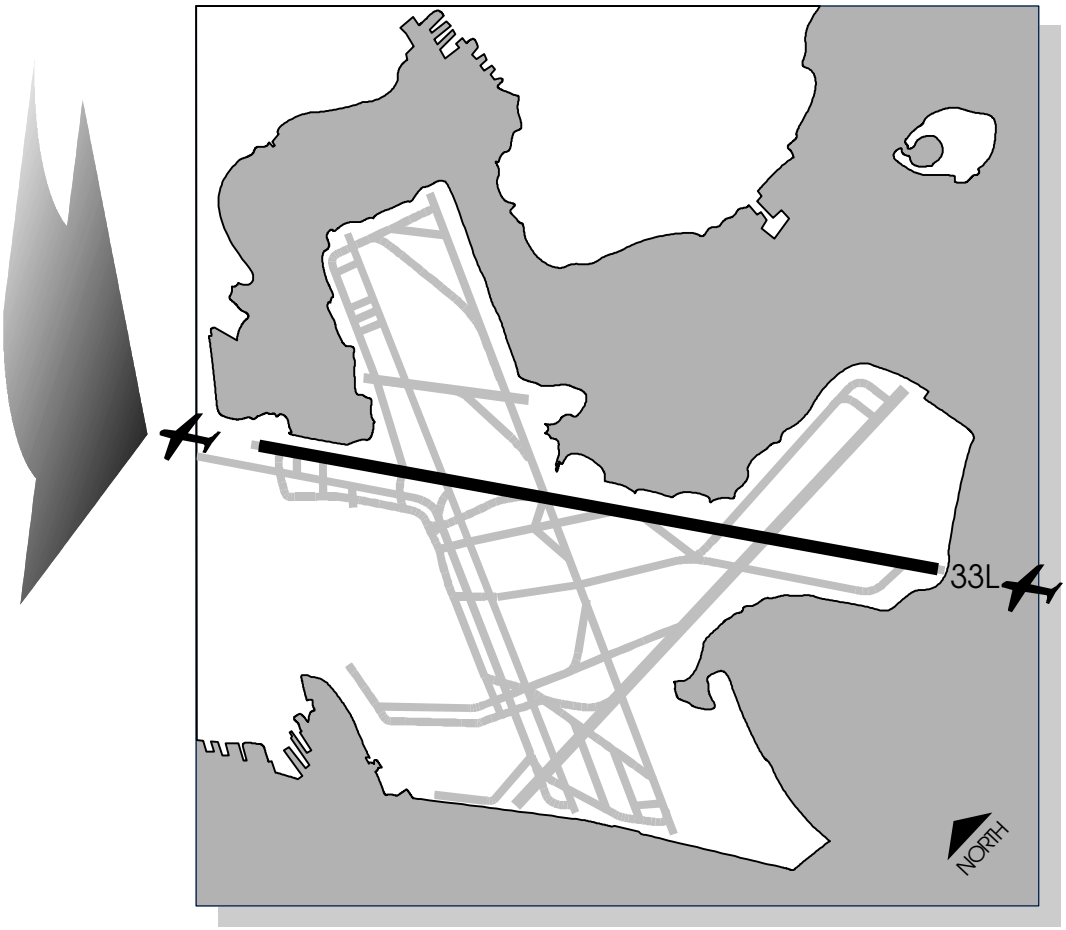
Wind Direction

Figure 1.2-5

Moderate Northwest Wind Configuration Using Runway 27 and Runway 33L

07466-FIG-1.2-5.p65

One-Runway Configuration



LEGEND

Wind Direction

Figure 1.2-6

Strong Northwest Wind Configuration Using Runway 33L

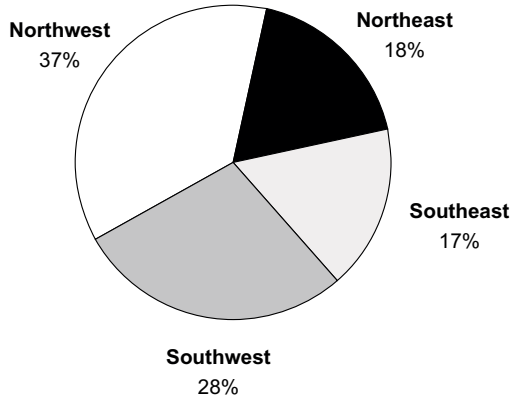
7676-FIG-1.2-6.p65

1.2.2.1 Impact of Wind and Weather Conditions on Airport Capacity

When weather conditions deteriorate, wind direction shifts to the northwest, or winds intensify, Logan is reduced to operating with only one or two active runways. A major limitation of Logan's airfield is the lack of a three-runway configuration in the northwest/southeast orientation. In fact, the need to correct this limitation was a driving force behind the initiation and development of the Airside Project. Even under clear weather conditions, northwest winds can force all operations to use two, or sometimes only one runway. Air traffic control procedures and other restrictions may further reduce the capacity of the one- or two-runway operating configurations. As a result, even when aircraft demand levels are moderate, delays can reach severe levels if wind or weather dictates the use of low capacity configurations.

Figure 1.2-7 illustrates the percentage of time that winds from different directions occur at Logan during a typical year. In light winds and good visibility, high capacity three-runway configurations are generally available. With moderate northeast and southwest winds, Logan can also operate on high capacity runway configurations. With northeast winds, the Runways 4L, 4R and 9 configuration is available for use (see Figure 1.2-2). When wind direction shifts to the southwest, the Runways 22L, 22R and 27 configuration is used (see Figure 1.2-3).

Figure 1.2-7
Typical Yearly Wind Direction at Logan



Source: National Weather Service, 1981 – 1990 hourly weather data

Wind-related delays become significant when moderate to high winds originate from the northwest, the most common wind direction at Logan. Because northwest winds usually coincide with clear, visual flight rules (VFR) weather conditions, operations could be accommodated with minimal delay if a three-runway configuration were available. In fact, Logan experiences VFR weather conditions 96 percent of the time when winds blow from the northwest. Under moderate northwest winds, Logan is forced to use the low-capacity Runway 27 and 33L configuration (see Figure 1.2-5). Two-runway configurations have an operational capacity of up to 90 operations per hour in VFR conditions.

When northwest winds are especially strong or gusty, Runway 27 cannot be used due to excessive crosswinds. Under these conditions, Runway 33L is the only runway available for both landings and takeoffs (see Figure 1.2-6). Logan's operational throughput is reduced to 60 or fewer operations per hour; aircraft delays become severe and increase exponentially.[9]

1.2.2.2 Impact of Aircraft Mix on Airport Capacity

Logan operates most efficiently when air traffic controllers are able to segregate aircraft of different weight classes into separate arrival streams, allowing shorter separation distances between aircraft. Thus, the highest operating capacities at the airport are achieved when a three-runway configuration is available for use. For example, when the Runways 4L, 4R and 9 configuration is available, Runway 4L is primarily used for non-jet arrivals, Runway 4R is primarily used for jet arrivals and Runway 9 is dedicated to departures.[10] However, when poor weather and/or wind conditions restrict runway availability, controllers are forced to place all aircraft in a single arrival stream, diminishing the airport's capacity. While aircraft are currently limited to a single arrival runway during northwest wind conditions, this would be corrected by construction of the proposed new runway.

When wind and weather conditions force Logan to use a single arrival stream, the mix of aircraft seeking to use the airfield influences the capacity of the airport's runways. For safety reasons the FAA sets minimum separation standards that must be maintained between aircraft. All aircraft generate aerodynamic turbulence, known as wake vortices, which trail behind the aircraft in flight. Larger aircraft produce much stronger vortices, which can upset smaller trailing aircraft. Therefore, if smaller aircraft must operate behind larger jets on the same runway, increased separations between aircraft must be maintained. Longer separations reduce the capacity of each runway, since fewer planes can land in a given hour. Because of its role as a regional hub for New England communities and its lack of a dominant jet carrier, Logan exhibits a high proportion of small aircraft operations.

1.2.2.3 Revised Wake-Vortex Turbulence Rules

In response to recommendations by the National Transportation Safety Board, the FAA implemented several revisions to the wake turbulence separations that became effective in 1996.[11] The changes to the wake turbulence separations are discussed in detail in Section 1.2.3.2 of the Airside Project Draft EIS/EIR. The revisions increased the average separation between arriving aircraft at Logan, and consequently decreased capacities and increased delay, particularly during use of two-runway configurations. These changes make it more important for air traffic controllers to be able to segregate aircraft arrival streams at Logan.

9 This condition occurs approximately 10 days per year. See the *Northwest/Southeast Winds Case Study*, Logan Airside Improvements Planning Project Draft EIS/EIR, Appendix I.
10 Runways 4L and 4R also handle some departures.
11 "Safety Issues Related to Wake Vortex Encounters During Visual Approach to Landing," *NTSB Report/SIR-94/01*, February 1994.

1.3 Passenger Volumes and Aircraft Operations

1.3.1 Year 2000 Activity and Historic Trends

Logan accommodated 27.4 million air passengers and 479,000 aircraft operations in 2000. More than 60 airlines, including national and international passenger airlines, commuter airlines, and all-cargo airlines, provide direct flights from Logan Airport to over 100 destinations worldwide. In addition to commercial airline services, Logan also handles general aviation activity. In 2000, Logan was the 18th busiest airport in the U.S. in terms of passenger traffic; 11th in aircraft operations; and 16th in cargo tons.[12] Logan functions primarily as an "origin/destination"[13] airport, with 88 percent of passengers originating or terminating at Logan, and only 12 percent of passengers connecting from one flight to another. However, Logan also serves as a regional hub, providing small and isolated New England communities with access to the national airport system. While regional carrier flights carry only a small percentage of total passengers, approximately half of their passengers rely on connections at Logan to reach their ultimate destinations.

Table 1.3-1 provides a summary of air passengers, flight operations, and freight volume from 1980 to 2000. Passenger volume at Logan has increased over time consistent with the increasing levels of air passenger traffic experienced nationwide. However, the rate of passenger growth at Logan has slowed in recent years. Since 1980, passenger traffic at Logan increased at an average annual rate of 3.1 percent. For the most recent five years (1995 to 2000) Logan passengers grew more slowly, increasing by 2.4 percent annually. In 2000, Logan's passenger traffic increased by just 1.3 percent over the prior year. The observed slow-down in Logan's passenger growth is attributable to the increased role of regional airports and rail as attractive transportation options to Logan Airport.

Aircraft operations at Logan have historically grown at a slower rate than passenger volume due to increases in aircraft size and/or passenger load factors. Between 1980 and 2000, aircraft operations increased at an average annual rate of 2.5 percent. Since 1995 the rate of aircraft operations growth has slowed to 0.9 percent per year. In 1999 and 2000, aircraft operations declined by 2.5 and 1.4 percent, respectively, as regional airlines reduced scheduled services at Logan.

More than 1 billion pounds of freight (cargo and mail) passed through Logan Airport in 2000. Approximately half of Logan's air freight is carried in the belly compartments of passenger aircraft and the remaining half is transported by all-cargo airlines, such as Federal Express and United Parcel Service. In 2000, all-cargo airlines performed approximately 12,000 aircraft operations at Logan, or 2.6 percent of Logan's total operations. Since all-cargo operations primarily occur during off-peak nighttime hours (10:00 PM and 6:00 AM), they do not contribute to aircraft delays at Logan.

12 Airports Council International, Worldwide Airport Traffic Report, June 2001. Note that Logan's operations rank was adjusted to reflect Massport's final operations count for 2000, which was released in September 2001.

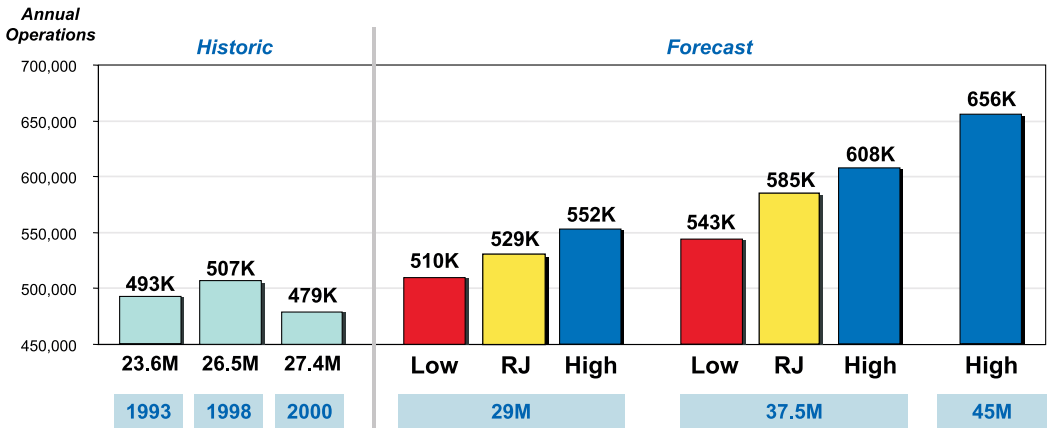
13 For an "origin/destination" airport, most passengers either originate or terminate their airline journey at that airport. For a connecting airport, a large percentage of passengers stop at the airport as part of their airline journey to transfer from one flight to another.

1.3.2 Forecast Aircraft Operations and Passenger Levels

Airline passenger traffic, both locally and nationally, has increased dramatically over time and is forecast to continue to grow into the future. The airfield operational and environmental impact analyses presented in Airside Project EIS Documents are based on forecasts of future aircraft operations and passenger demand for Logan Airport. Multiple aircraft fleets were analyzed for each future passenger demand level. An aircraft fleet consists of a mix of different aircraft types (i.e., large jets, regional jets and non-jets). A fleet with a high proportion of large jets, which carry more passengers than regional jets or non-jets, requires comparatively fewer annual aircraft operations for a given number of passengers than a fleet with a lower proportion of large jets.

Massport has adopted a range of near-term and long-term activity forecasts for planning purposes (see Figure 1.3-1). Annual passenger demand for Logan Airport is forecast to reach 29 million passengers (29M) early in this decade. Logan's air passenger level reached 27.4 million in 2000, or 96 percent of the 29M near-term passenger forecast.[14] If passenger growth at Logan continues to slow due to the effectiveness of regional transportation options, the Airport is expected to reach 29 million passengers by 2005, 34 million passengers by 2010, and 37.5 million passengers (37.5M) by 2015. These projections are more conservative than the forecasts presented in the Airside Project Draft EIS/EIR, which assumed that Logan would reach these activity levels earlier, i.e., 29M in 1999 and 37.5M in 2010. Nevertheless, the analyses presented in the Airside Project Draft EIS/EIR remain valid because they present the operational and environmental impacts associated with a range of future near-term and long-term operating levels. The revised forecast dates are consistent with the FAA's Terminal Area Forecasts for Logan Airport. In its 2001 Terminal Area Forecasts, the FAA projected that Logan Airport would reach 34.0 million passengers in 2010 and 37.3 million passengers in 2015.

Figure 1.3-1
Logan Airside Passenger and Fleet Forecasts – Annual Operations by Fleet Scenario



14 Massport's planning forecasts were reviewed in the *Logan Airport 1999 Environmental Status and Planning Report*, December 15, 2000.

Table 1.3-1
Air Passengers, Aircraft Operations, and Freight: 1980 to 2000

Year	Air Passengers (000)	Annual Percent Change	Flight Operations (000)	Annual Percent Change	Total Cargo and Mail* (000 lbs.)	Annual Percent Change
1980	14,850	-	296	-	505,245	-
1981	14,941	0.6%	284	-4.1%	497,632	-1.5%
1982	15,959	6.8%	275	-3.2%	503,151	1.1%
1983	17,905	12.2%	316	14.9%	597,483	18.7%
1984	19,488	8.8%	351	11.1%	677,803	13.4%
1985	20,506	5.2%	380	8.3%	666,994	-1.6%
1986	21,933	7.0%	396	4.2%	664,559	-0.4%
1987	23,369	6.5%	415	4.8%	706,046	6.2%
1988	23,732	1.6%	408	-1.7%	784,730	11.1%
1989	22,274	-6.1%	389	-4.7%	752,554	-4.1%
1990	22,878	2.7%	425	9.3%	753,253	0.1%
1991	21,450	-6.2%	430	1.2%	766,584	1.8%
1992	22,723	5.9%	474	10.2%	819,522	6.9%
1993	23,579	3.8%	493	4.0%	835,746	2.0%
1994	24,468	3.8%	459	-6.9%	923,557	10.5%
1995	24,192	-1.1%	466	1.5%	869,642	-5.8%
1996	25,134	3.9%	456	-2.1%	911,166	4.8%
1997	25,568	1.7%	483	5.8%	974,170	6.9%
1998	26,527	3.8%	507	5.2%	970,764	-0.3%
1999	27,052	2.0%	495	-2.5%	987,655	1.7%
2000	27,413	1.3%	488	-1.4%	1,047,250	6.0%

* Includes cargo and mail carried in all-cargo aircraft and in the belly compartments of passenger aircraft.

Sources: *Boston-Logan International Airport,1994/1995 Generic Environmental Impact Report*; *Logan Airport Annual Updates - 1996,1997and 1998*; *Logan Airport, 1999 Environmental Status and Planning Report.*
Boston-Logan International Airport, Monthly Airport Traffic Summary, December 2000 (revised).

Massport's projected operations for the near-term (i.e., 29 million passengers) are 510,000 for a Low Fleet scenario and 552,000 for a High Fleet scenario. For the long-term (i.e., 37.5M passengers), annual aircraft operations are forecast to range from 543,000 to 608,000. The forecast range for aircraft operations reflects different assumptions regarding the aircraft fleet mix at Logan. The Low Fleet scenarios assume only two major regional airlines and a higher proportion of large jet aircraft operations than assumed in the High Fleet scenarios. The High Fleet scenarios assume a fleet mix similar to 1993 conditions, when three major regional carriers accounted for nearly 50 percent of total airport operations and airline overscheduling occurred during peak periods.

For this Final EIS, an alternative near-term fleet, the 29M RJ Fleet, was evaluated to assess the near-term impacts of increasing numbers of regional jet aircraft in the Logan fleet mix.[15] The 29M RJ Fleet supplements the long-term 37.5M High RJ Fleet that was introduced in the Supplemental DEIS/FEIR and, like the 37.5M High RJ Fleet, it has a higher proportion of the new technology regional jets than the fleets that were previously analyzed in the Draft EIS/EIR.

These fleet scenarios represent unconstrained forecasts of aircraft activity. For certain long-term, High Fleet scenarios, delay levels are substantial due to the high number of total operations and serious overscheduling during peak periods. Under these scenarios, demand management initiatives may be implemented to limit overscheduling during peak periods and reduce the resulting levels of delays. Figure 1.3-2 shows that demand management reduces the projected level of total operations under scenarios with high demand. These activity reductions have been incorporated in the Alternatives that include Peak Period Pricing.

While demand management would reduce both operations and flight delays, the unconstrained High Fleet scenarios were considered in the EIS analysis for the following reasons:

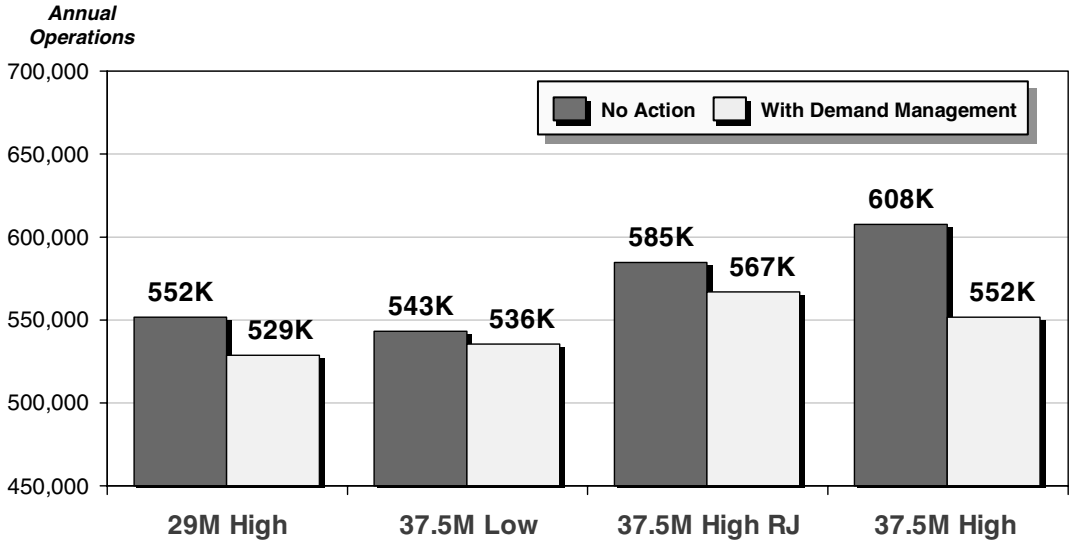
- The delay reduction and environmental impacts of peak period pricing, a form of demand management that was separately considered in the Airside Project EIS, can only be identified through comparison to an unconstrained No Action Alternative.[16]
- The long-term High fleet forecasts represent a realistic outer range of unconstrained activity and provide a conservative upper bound for environmental impacts under the No Action Alternative.
- The long-term High scenarios reflect a degree of overscheduling that has historically occurred at Logan. In 1993, when Logan was served by three regional carrier systems, hourly flight activity exceeded 120 operations per hour for three hours during peak summer periods (August weekdays). Recent growth in regional jets and the continued presence of multiple regional carrier systems suggest that a return to similar

15 Based on a review of changes in delays and runway utilization patterns under the 29M RJ Fleet scenario, the environmental impacts of the Preferred Alternative are projected to be consistent with the other fleet scenarios analyzed in the Draft EIS and the Supplemental DEIS. See Section 3.4.3 of this Final EIS.

16 While peak period pricing was considered as an improvement option in Alternatives 1, 2, and 3, the No Build Alternative, Alternative 3, only includes peak period pricing and the reduced minimums and excludes other build options.

overscheduling conditions represents a reasonable unconstrained forecast scenario. The August weekday demand profile for the 37.5M High RJ fleet shows only four hours with demand greater than 120 hourly operations. The remaining long-term growth in operations is shifted to off-peak hours, consistent with recent Logan trends as described in Section 4.2.2.3 of the Supplemental DEIS/FEIR.

Figure 1.3-2
High Demand Fleet Forecasts Constrained by Demand Management



This Final EIS summarizes the results for the Preferred Alternative and No Action Alternative under the 29M Low Fleet and the 37.5M High Fleet scenarios, which are described in detail in the Airside Project Draft EIS/EIR. The operational and environmental analyses for Alternatives 1, 2 and 3 for the 29M Low Fleet and 37.5M High Fleet are described in detail in Sections 4.4, 4.5, 6.2 and 6.3 of the Draft EIS/EIR and are summarized in Appendices C, E and F of the Supplemental DEIS/FEIR. All alternatives for the 37.5M High RJ fleet are analyzed in Sections 4.7, 6.2.7, and 6.4.4 of the Supplemental DEIS/FEIR. Analysis of the 29M RJ Fleet is described in Section 3.4 of this Final EIS. For ease of reference, the analysis assumptions for the fleet scenarios discussed in this Final EIS are summarized in Table 1.3-2. The individual fleet scenarios are more fully described in Section 4.2 of the Draft EIS/EIR, Section 4.2 of the Supplemental DEIS/FEIR, and Section 3.4 of this Final EIS.

Table 1.3-2
Passenger and Aircraft Operations Levels Presented in the Final EIS

Time Frame	Annual Passengers	Annual Aircraft Operations	Fleet Assumptions	Final EIS Alternatives	Final EIS Fleet Scenarios
Near Term	29 million	510,000	Low Fleet ■ 2 major regional carriers ■ No airline overscheduling	1A and 4 [1]	29M Low Fleet
Long Term	37.5 million	608,000	High Fleet ■ 3 major regional carriers ■ Airline over scheduling during peak periods	1A and 4 [1]	37.5M High Fleet
Near Term	29 million	529,000	RJ Fleet ■ Regional jet aircraft 22% of the fleet	1A and 4 [2]	29M RJ Fleet
Long Term	37.5 million	585,000	High RJ Fleet ■ 3 major regional carriers ■ Regional jet aircraft 31% of the fleet ■ Airline overscheduling during peak periods	1A and 4 [3]	37.5M High RJ Fleet

1 Analysis results for Alternatives 1, 2 and 3 are contained in Sections 4.4, 4.5, 6.2 and 6.3 of the Draft EIS/EIR.
2 Analysis results are contained in Section 3.4 of this Final EIS.
3 Analysis results for Alternatives 1, 2 and 3 are contained in Sections 4.7, 6.2.7, and 6.4.4 of the Supplemental DEIS/FEIR.

1.3.3 Logan's Demand Profile

While the volume of annual operations is critical for evaluating Logan's operational and environmental impacts, the distribution of that volume is also important. Flight demand varies by hour, by day of week, and by season, and this variation can have a significant impact on airport delays. This pattern of hourly flight activity is referred to as the airport demand profile.

Logan's capacity during visual flight rules (VFR) conditions[17] is approximately 120 operations per hour, and these VFR conditions prevail approximately 80 percent of the year. Under these good weather conditions, delays accumulate only when demand exceeds the VFR capacity of the airport for a sustained period of time. If demand at an airport causes delays even in good weather, an overscheduling situation exists.

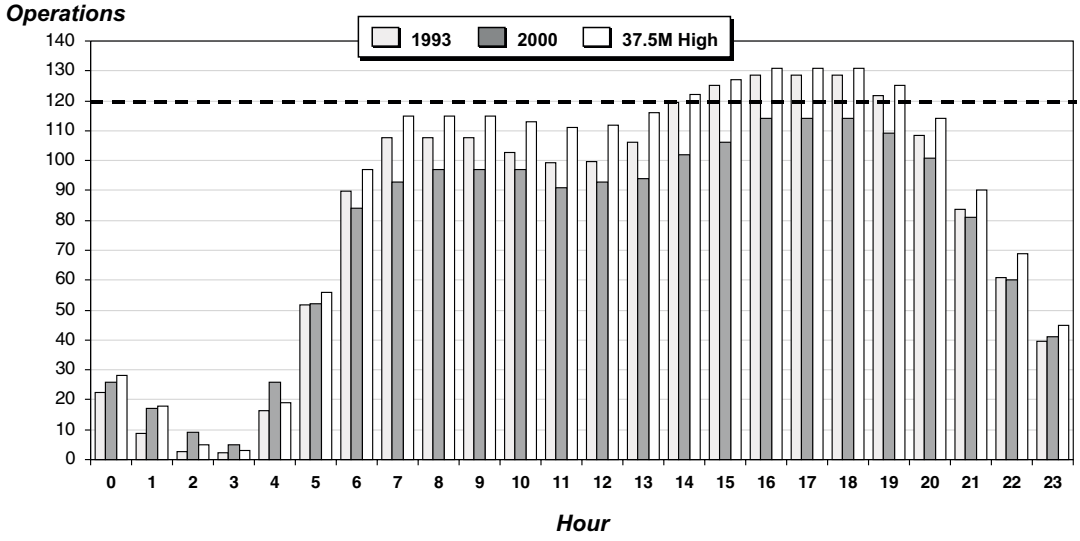
Delays due to airline overscheduling become significant when flight activity levels exceed airfield capacity for a sustained period of time. When a short period of excess demand is followed by a period of low activity, the airfield has an opportunity to recover and only moderate delays are incurred. If, however, flight activity levels reach or exceed available capacity for a number of consecutive hours, delays build rapidly as flights delayed during one hour add to schedule demand during the next hour. For this reason, three-hour

17 Visual Flight Rules (VFR) are rules covering operation and navigation of aircraft primarily by visual reference to the horizon (for aircraft control) and see-and-avoid procedures (for traffic separation). VFR is used by approximately 70 percent of all flights.

averages of forecast flight activity levels were used to determine the periods when sustained airline overscheduling conditions exist. It is during these periods that a peak surcharge might be applied.

Figure 1.3-3 compares the August weekday demand profiles for 1993 and 2000 with the forecast demand profile for the 37.5M High Fleet. In 1993, a record year for delays at Logan, demand was considerably more peaked than in 2000 and exceeded the airport's average VFR capacity of 120 hourly operations and the average all-weather capacity of 115 for six consecutive afternoon hours. In contrast, the August 2000 weekday profile never exceeded the average all-weather capacity. The profile comparison clearly demonstrates that while overscheduling was a problem in 1993, it was not a problem in 2000. The 37.5M High fleet assumes three major regional carriers and a high percentage of small regional aircraft. Under this forecast scenario, flight demand exceeds Logan's average VFR capacity for six consecutive hours and the average all-weather capacity for most of the day. Clearly, airline overscheduling would be expected to cause serious delays under these conditions.

Figure 1.3-3
Logan's Demand Profile –
1993 vs. 2000 vs. 37.5M High (3 Hour Maximum Average)*



* Value shown for each hour represents average hourly operations for the three-hour periods that contain the individual hour. This measure is used to recognize that delays become significant when flight demand exceeds available capacity for a period of multiple consecutive hours.

1.4 Delays at Logan

Delay simulation modeling conducted for the Airside Project Draft EIS/EIR indicates that Logan experienced approximately 120,000 hours of runway delays in 1998. This is six times the FAA's threshold of 20,000 annual delay hours for identifying severely congested airports, which emphasizes the magnitude of Logan's delay problem.

All available measures of delay confirm the severity of aircraft delays at Logan. For 2000, the FAA reports that Logan ranked 6th among the nation's largest airports in delayed operations and 2nd in arrival delays, yet it was only the 11th, busiest U.S. airport in terms of aircraft operations.

This section presents historical delay statistics for Logan and comparative delay measures for Logan and other major U.S. airports. The section also provides a description of existing delay measures, identifies the inherent drawbacks of these statistics, and discusses the appropriateness of simulation modeling for estimating delays. The various delay databases maintained by the FAA and U.S. DOT, and the methodologies employed by each to quantify delays are described in Appendix C of the Supplemental DEIS/FEIR.

1.4.1 Delays at Logan and Other U.S. Airports

There is a variety of sources for Logan Airport delay statistics including data collected by the FAA and the U.S. DOT and simulation modeling performed by the FAA and the Airside Project study team. Each data source utilizes a distinct methodology for counting delays and produce varying delay measures. Nevertheless, all delay data sources are consistent in demonstrating that Logan suffers from a serious delay problem. (See Appendix C of the Supplemental DEIS/FEIR for a full description of the publicly available delay data sources.)

Table 1.4-1 presents a 10-year history of Logan's U.S. airport rank for delayed operations using the FAA Air Traffic Operations Network (OPSNET) database.[18] Based on this delay measure, the FAA has consistently designated Logan as a "seriously congested airport." The table also shows that Logan's rank by arrival delays has progressively worsened over the past decade. In 2000, Logan ranked second nationwide—its worst ranking since at least 1990.

18 OPSNET is the official FAA delay reporting system for air traffic management purposes and was formerly known as the Air Traffic Operations Management System (ATOMS). Additional information is provided in Appendix C of this Supplemental DEIS/FEIR. OPSNET counts only the number of flights that suffer a delay of more than fifteen minutes at a single element of the air traffic control (ATC) system (a sector or airport).

Table 1.4-1
Logan's Airside Delay Rank Among U.S. Airports

Year	Rank by Total Delays	Rank by Arrival Delays
1990	9	9
1991	6	7
1992	6	6
1993	5	6
1994	6	4
1995	9	4
1996	9	4
1997	9	3
1998	6	3
1999	7	5
2000	6	2

Source: FAA Air Traffic Operations Network (OPSNET)

Table 1.4-2 compares operations and delays at ten of the busiest airports in the United States based on the FAA OPSNET data. In 2000, New York LaGuardia had the nation's worst delay problem according to OPSNET, followed by Newark and Chicago O'Hare. While Logan ranked 5th in delays per 1,000 operations (and 6th in total delays), it experienced a significantly higher rate of delay than Atlanta, Dallas/Ft. Worth, and Los Angeles even though these airports accommodated 54 to 80 percent more operations than Logan.

Table 1.4-3 compares 2000 delay estimates from the U.S. DOT's Air Traffic Consumer Reports (ATCR)[19] for the same ten busy U.S. airports. This table shows the percentage of arrivals or departures that were delayed by more than 15 minutes at each airport. While arrivals are delayed more frequently than departures at most airports, Logan has the fourth highest percentage of arrival delays based on the ATCR data. This is similar to the OPSNET data that showed Logan with the 2nd highest rate of arrival delays. The two rankings differ because of different methodologies for counting delays. For example, ATCR estimates that 35 out of 100 arrivals were delayed at Logan in 2000, but OPSNET counts 3 arrival delays per 100 flights. While the methodologies for counting delays differ, both databases indicate that Logan experiences a higher rate of arrival delays than nearly all other large U.S. airports.

19 The U.S. DOT's Air Traffic Consumer Reports (ATCR) provide information about the on-time performance of airline flights. They are based on Airline Service Quality Performance (ASQP) data filed by major carriers. See Appendix C of the Supplemental DEIS/FEIR for a full discussion of public delay databases.

Table 1.4-2
FAA OPSNET: 2000 Delay Ranking for Ten of the Busiest U.S. Airports

Airport	Operations	Delayed Flights	Delayed Flights per 1,000	Delayed Arrivals	Delayed Arrivals per 1,000
Atlanta	913,449	28,229	30.9	11,022	24.1
Boston Logan	**508,283**	**24,120**	**47.5**	**6,863**	**27.0**
Chicago O'Hare	908,977	57,545	63.3	4,801	10.6
Dallas/Ft. Worth	865,777	20,638	23.8	1,180	2.7
Los Angeles	783,684	17,141	21.9	1,142	2.9
New York Kennedy	358,951	13,930	38.8	648	3.6
New York LaGuardia	392,047	61,120	155.9	3,856	19.7
Newark	457,182	37,132	81.2	3,836	16.8
San Francisco	430,612	24,478	56.8	6,541	30.4
St. Louis	484,224	8,837	18.2	1,178	4.9

	Comparative Operations Index*	Rank	Rank	Rank	Rank
Atlanta	180	4	7	1	3
Boston Logan	**100**	**6**	**5**	**2**	**2**
Chicago O'Hare	179	2	3	4	6
Dallas/Ft. Worth	170	7	8	7	10
Los Angeles	154	8	9	9	9
New York Kennedy	71	9	6	10	8
New York LaGuardia	77	1	1	5	4
Newark	90	3	2	6	5
San Francisco	85	5	4	3	1
St. Louis	95	10	10	8	7

Note: Boston ranks 5th in operations among the airports listed, but 11th nationally. Other delay rankings for Logan are also national delay rankings.

* Operations Index-- Boston = 100

Source: FAA Air Traffic Operations Network (OPSNET)

Table 1.4-3
U.S. DOT Air Travel Consumer Report: Percentage of Flights Delayed by 15 Minutes or More at Ten Busy U.S. Airports in 2000

Airport	Departure Flight Delays	Arrival Flight Delays
Atlanta	23.4%	25.1%
Boston Logan	**25.3%**	**34.5%**
Dallas/Ft. Worth	21.9%	22.0%
Newark	23.6%	30.8%
New York Kennedy	20.7%	28.1%
Los Angeles	27.8%	33.5%
New York LaGuardia	28.9%	42.9%
Chicago O'Hare	33.2%	36.8%
San Francisco	30.0%	39.2%
St. Louis	22.9%	22.4%

Source: U.S. DOT, Air Travel Consumer Report.

Table 1.4-4 ranks the 29 Large Hub[20] U.S. airports by average minutes of delay by phase of flight based on the FAA's Consolidated Operations and Delay Analysis System (CODAS)[21] data for CY 2000. Boston is ranked 5th worst by airborne delays, 3rd by arrival delays, 7th in taxi-in delays and 10th by taxi-out and gate delays. The CODAS data captured 81 percent Logan's actual 2000 operations. The arrival delay ranking is comparable with the OPSNET and ATCR databases.

In addition to the FAA and U.S. DOT delay databases, delay simulation modeling can be used to estimate the total annual hours of delays experienced at an airport. Delay modeling is more comprehensive than the delay databases that only report a portion of the actual delays incurred. Moreover, the operational benefits of infrastructure improvements can only be identified through simulation modeling. For this reason, the FAA requires the use of delay simulation models to assess the benefits of major airport investment projects, such as new runways.

20 Large Hub airports are those airports enplaning one percent or more of total passengers. There are 29 Large Hub airports in the U.S.

21 CODAS was created by the FAA, Office of Policy and Planning to provide more consistent estimates of aircraft delay by combining data from several existing sources, including data from the FAA, U.S. DOT, the Official Airline Guide (OAG), the air carrriers' Computerized Reservation System (CRS) and the Air Transport Association (ATA). See Appendix C of the Supplemental DEIS/FEIR for a full discussion of public delay databases.

Table 1.4-4
FAA CODAS: Average Delay by Phase of Flight at the 29 Large Hub Airports (Minutes) – CY 2000

Rank	Taxi-out		Airborne		Taxi-In		Arrival		Gate	
1	LGA	15.6	PHL	6.56	DFW	3.64	LGA	25.45	LGA	14.8
2	EWR	12.07	EWR	5.87	DTW	3.44	SFO	22.35	DEN	14.25
3	PHL	9.84	ATL	5.72	LAX	3.02	**BOS**	**20.06**	JFK	13.99
4	JFK	8	LGA	5.47	LGA	2.84	ORD	19.96	EWR	13.32
5	ORD	7.76	**BOS**	**5.39**	ORD	2.83	EWR	19.2	SFO	13.31
6	ATL	7.67	JFK	4.28	PHL	2.49	HNL	18.12	ORD	13.25
7	DTW	7.59	CLT	4.26	**BOS**	**2.34**	PHL	17.66	PHX	12.6
8	MSP	7.4	ORD	4.07	ATL	2.3	JFK	17.22	ATL	12.58
9	DFW	7.14	SEA	4.07	EWR	2.12	LAX	16.75	PHL	11.93
10	**BOS**	**6.99**	MSP	3.94	JFK	2.03	ATL	15.15	**BOS**	**11.46**
11	STL	6.4	SLC	3.88	DEN	1.93	DEN	15.14	CVG	11.05
12	CVG	5.76	SFO	3.84	STL	1.82	PHX	14.85	STL	10.77
13	IAH	5.71	STL	3.71	MIA	1.71	LAS	14.83	MSP	10.48
14	SFO	5.57	DCA	3.46	PHX	1.7	MCO	14.49	DFW	10.27
15	DCA	5.4	DTW	3.44	LAS	1.66	MIA	14.41	MIA	10.1
16	PHX	5.24	PIT	3.4	MSP	1.59	SEA	14.08	LAS	9.83
17	CLT	5.21	IAH	3.25	SFO	1.49	SAN	13.93	DTW	9.76
18	MIA	5.14	LAX	3.25	IAH	1.43	BWI	13.83	BWI	9.63
19	LAX	5.11	DEN	3.06	CLT	1.4	CVG	13.66	HNL	9.52
20	PIT	4.8	CVG	3.04	SEA	1.23	STL	13.44	MCO	9.35
21	LAS	4.39	MIA	2.98	HNL	1.22	TPA	12.9	SAN	9.09
22	SLC	4.36	PHX	2.97	SLC	1.12	DTW	12.33	SEA	9.01
23	DEN	4.15	DFW	2.76	PIT	1.07	DFW	11.9	IAH	8.97
24	MCO	3.42	MCO	2.45	BWI	1.03	IAH	11.75	LAX	8.64
25	SEA	3.08	BWI	2.31	DCA	1	SLC	11.62	PIT	8.42
26	BWI	2.87	TPA	2.02	MCO	0.96	MSP	11.56	SLC	8.25
27	SAN	2.75	SAN	1.43	TPA	0.74	DCA	11.51	TPA	8.15
28	HNL	2.7	LAS	1.42	CVG	0.7	PIT	11.45	CLT	8.07
29	TPA	2.48	HNL	1.25	SAN	0.7	CLT	10.66	DCA	7.71

Sources: Consolidated Operations and Delays Analysis System (CODAS); FAA Office of Aviation Policy and Plans (APO)

1.4.1.1 Comparison of FAA and Airside Simulated Delays for Logan Airport

In 1992, the FAA Technical Center simulated Logan airfield operations with the Runway Delay Simulation Model (RDSIM) model and estimated that total delay would approach

270,000 hours per year at an activity level of 504,000 annual operations.[22] In comparison, simulation modeling for the Logan Airside Improvements Planning Project estimated 120,000 runway delay hours for an annual operations level of 507,000 in 1998. Table 1.4-5 compares the FAA Technical Center modeled delay with the Airside Project's delay estimate. As shown, the Airside Project's results are lower than what the FAA model predicted at a similar level of operations. The FAA has concluded that the Airside Project modeled delays represent "a plausible and conservative estimate when compared with the earlier and simpler Logan Capacity Task Force simulation of the Airport."[23]

Table 1.4-5
Comparison of Airside Project Modeled Delays for Logan Airport

Source	Year/Scenario	Logan Operations	Estimated Annual Delay Hours
FAA*	Future Year	504,000	268,700
Airside Project	1998	507,000	120,000

* FAA Airport Capacity Task Force

1.5 Logan's Role in the Regional Economy

Efficient aviation facilities are a critical component of a region's economic system and structure. As the largest airport in the six-state New England region, Logan provides air passenger and cargo services to international and domestic destinations, which play a significant role in the Boston and New England economies. This section discusses the importance of convenient air service to the local and regional economies, as well as the effects of Logan as an economic entity that provides employment and other direct and indirect benefits to the economy.

1.5.1 Boston's Need for Efficient Air Travel

The New England economy is largely based on a mix of travel-intensive service industries that depend on high-quality air transportation services. As illustrated in Table 1.5-1, the economies of Boston and the Commonwealth of Massachusetts have higher proportions of employment in the services and finance, insurance, and real estate sectors, than the nation as a whole. Section 1.2.1 of the Airside Project Draft EIS/EIR provides a more detailed description of the service industry in the region, including the number and names of major employers.

22 *Boston Logan International Airport Capacity Enhancement Plan*, FAA, October 1992.
23 FAA New England Region letter to Massport, dated June 14, 1999.

Table 1.5-1
Share of Employees by Industry Sector

Industry Sector	Boston	MA	US
Services	40%	36%	30%
Wholesale and Retail Trade	22%	23%	23%
Manufacturing	11%	14%	15%
Government	11%	12%	15%
Finance, Insurance, Real Estate	8%	7%	6%
Construction and Mining	3%	4%	5%
Transportation, Communications and Utilities	4%	4%	5%

Source: U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, September 1998.

The major service industries in the region include financial services, research and development, higher education, consulting, high technology, and health care and medical services. All of these industries are travel intensive because they operate in national and global markets with clients around the world. These industries often involve collaborative efforts among individuals or corporations that work closely together despite distances. Boston's hospitals and medical services are internationally recognized and highly rated, and therefore draw patients from around the world. As a global center for these industries, the region also hosts related conferences and conventions. Similar large gatherings from many other industries are drawn by the region's historic, cultural and natural attractions.

1.5.2 Tourism and the Regional Economy

Tourism is a key sector of the local and regional economies, and tourists that arrive by air typically spend more, stay longer, and provide more economic benefits to the region than those arriving by other modes. In Massachusetts, approximately 108,000 full-time jobs are created by the tourism industry, and 30,000 of these are located in Boston.[24] The number of visitors to the Greater Boston area increased by 5 percent annually between 1992 and 1997, rising from 8.8 million to 11.1 million.[25] Visitors come from all over the U.S. and the world. Over half of Boston's U.S. visitors come from outside New England and more than one-fourth arrive by air. More than a million international visitors (excluding residents of Canada and Mexico) come to Boston annually, each spending an average of $1,400 during their stay.[26]

1.5.3 Logan is a Major Employer and Economic Catalyst

In addition to supporting the intercity travel needs of the region's businesses and facilitating the tourism trade, Logan itself is a major contributor to the regional economy. Activity at Logan generated an estimated $1.4 billion in direct economic benefits and

24 *1997 Fact Sheet*, Greater Boston Convention and Visitors Bureau.
25 *1998 Fact Sheet*, Greater Boston Convention and Visitors Bureau.
26 *1997 and 1998 Fact Sheets*, Greater Boston Convention and Visitors Bureau.

$5.0 billion, or an average of $13.6 million every day, in total economic benefits during Fiscal Year 1998 (see Table 1.5-2).[27]

As owner and operator of Logan Airport, Massport provides most of Logan's major facilities, leases land and building space to other businesses at the airport, and coordinates ground access services to Logan. Massport employs more than 700 people at Logan. Massport is also continually planning for the airport's future needs through capital investment programs and is responsible for financing the facilities, as well as raising the necessary capital by leveraging revenue primarily from fees and rentals paid by airport users. Some airport costs are partly offset by federal grant money.

More than 60 airlines serve Logan and some 100 aviation-related businesses provide airport support services. Passenger travel services are augmented by restaurants and retail shops in the terminals; hotels; banks; medical offices; rental car agencies; and limousine, bus and taxi services. Of the 15,000 people working at Logan, only about 5 percent are employed by Massport, with the remaining 95 percent employed by private industry and other government entities. In addition to the direct economic impacts of these activities at Logan, indirect benefits are generated as the tourist and supplier industries support the air transportation business at Logan. Additional economic activity and jobs, generated by these employees through the "multiplier" effect as they spend their paychecks, are included in the $5.0 billion of total economic benefits generated by Logan each year (see Table 1.5-2).

Table 1.5-2
Estimated Economic Impact of Logan - Fiscal Year 1998

Activity	Amount in $ millions
Direct Economic Benefits:	
Employee Payroll and Benefits from Direct Activity	$ 713
State and Local Tax Revenue from Direct Activity	84
Mass Turnpike Authority Tolls and MBTA Fare Revenue	31
Public and Private Expenditures of Facility Tenants and Operators	381
Direct Income to Select Companies/Tenants	162
Subtotal Direct Economic Benefits	$1,371
Indirect and Induced Economic Benefits:	
State and Local Tax Revenue from Indirect Facility Activity	$ 178
Visitor Expenditures	2,467
Travel Agency Commissions	298
Income Multiplier (on Employee Payroll and Benefits only - net of taxes)	654
Subtotal Indirect and Induced Economic Benefits	$3,597
Total Estimated Economic Benefits	**$4,968***

* Estimates for 2000 indicate that Logan contributed nearly $6.5 billion to the regional economy. Based on *Logan International Airport's Evolving Role in the New England Economy [Draft],* Economic Development Research Group, Fall 2001

Source: *Economic Impact Analysis,* Massport, Fiscal Year 1998.

27 *Economic Impact Analysis*, Massport, Fiscal Year 1998.

1.6 Cost of Delay to Logan Users

Delays at Logan impose substantial costs on airlines and passengers. Massport estimates that Logan flight delays cost airlines and passengers more than $300 million in 1998. When flights are delayed, the following types of costs are incurred:

- Airlines experience additional operating costs such as increased fuel, maintenance and crew costs;
- Passengers onboard the aircraft risk missed connections and lose personal or work-related time.

Additional costs, that have not been quantified, accrue to people waiting to meet delayed passengers and to shippers who may miss important flight or delivery times. Additional discussion of the costs of delay is provided in Section 1.6 of the Airside Project Draft EIS/EIR.

1.6.1 Cost of Delay to Airlines

The costs associated with delay are often difficult to quantify and require the use of different metrics. The magnitude of airport user costs can be estimated from data on airline operating costs and from FAA statistics on the value of time. Based on these data, the estimated airline cost per hour of delay ranges from $348 for a representative regional carrier non-jet aircraft[28] up to $1,585 for a representative 150-seat jet. Given the mix of aircraft operating at Logan, the average airline cost of delay is estimated at $1,115 per hour.

1.6.2 Cost of Delay to Airline Passengers

When flights are delayed, passengers incur lost time. The average passenger aircraft at Logan enplaned (or deplaned) 53 passengers in 1998.[29] On average, when a Boston aircraft is delayed by a single hour, 53 passengers each lose one hour of time. In a 1997 FAA Office of Aviation Policy and Plans (APO) Bulletin, the U.S. DOT/FAA recommended the use of a $27 per hour value of time[30] for the evaluation of regulatory programs impacting airline passengers. Using this value, the average economic cost to airline passengers for a single hour of aircraft delay is $1,431 per flight.

1.6.3 Total Cost of Delay

Considering the impact of delay on both airline operating costs and lost passenger time, the total cost of delay at Logan is estimated at approximately $2,500 per hour, producing an annual cost of more than $300 million in 1998.[31] The hourly cost of delay can be applied

28 Regional aircraft costs reflect a blend of 19-seat Beech-1900 and 34-seat Saab 340. In 1998, these were the most prevalent regional aircraft at Logan.
29 Massport statistics.
30 U.S. DOT/FAA, "Treatment of Values of Passenger Time in Economic Analysis," *APO Bulletin* (APO-97-1), June 1997.
31 Estimated annual cost is for runway delay only.

to the estimated hours of delay reduction that will result from the various Airside Project Alternatives, in order to quantify the benefit associated with each.

1.7 Improvement Concepts and Alternatives Analysis

Previous studies by Massport and FAA, including the *Logan Airside Improvements Feasibility Study* (July 1995), identified a number of improvement concepts that have the potential to reduce congestion and delays and, in some cases, enhance safety at Logan. These concepts were reviewed during the EIS public scoping process and specified as the improvement concepts to be analyzed in the EIS. These concepts, and their intended primary functional benefits, are summarized in Table 1.7-1:

Table 1.7-1 Concepts for Logan Airside Improvements

Improvement Concept*	Primary Function
Unidirectional Runway 14/32	Reduce delays that occur during northwest wind conditions when Logan operates on one or two runways, reducing its normal three runway capacity.
Taxiway Improvements • Centerfield Taxiway • Taxiway Delta Extension • Taxiway November Realignment • Southwest Corner Taxiway System Reconfiguration	Reduce taxiway congestion and enhance safety by facilitating more efficient movement of aircraft and reducing potential for runway incursions and wingtip conflicts.
Reduced Approach Minimums for Runways 15R, 22L, 27 and 33L	Allow pilots to reach landing decision points at heights consistent with those in effect at other U.S. airports. This will reduce reliance on Runway 4R and enhance safety under low visibility operating conditions.
Peak Period Pricing	Allow economic forces to eliminate flights during periods when demand exceeds airfield capacity.

* Each of these concepts, including their location and the nature of various physical changes to the airfield that may be required to implement them, is described in more detail in Chapter 3 of the Draft EIS/EIR and the Supplemental DEIS/FEIR, and in Section 1.8 of this Final EIS.

As a result of scoping directives issued by the FAA after a public scoping process, the individual improvement concepts described above, were grouped into the following Alternatives for comparative analytical purposes:

- Alternative 1 – All improvement concepts
- Alternative 1A – Preferred Alternative – All improvement concepts, except Peak Period Pricing
- Alternative 2 – All improvements concepts, except unidirectional Runway 14/32
- Alternative 3 – No Build – Reduced Minimums and Peak Period Pricing only
- Alternative 4 – No Action

This analytic structure was chosen in order to allow for comparison of operational and environmental impacts in a manner that would enhance federal decision-making. For example, a comparison of Alternative 1 and Alternative 1A provides context for judging the benefits and/or disbenefits of Peak Period Pricing as distinct from the other improvement concepts. Similarly, a comparison between Alternative 2 and Alternative 1 provides context for judging the benefits and/or disbenefits of unidirectional Runway 14/32 as distinct from the other improvement concepts. The inclusion of No Build and No Action Alternatives provides further context.

1.8 Proposed Action

Based upon a review of operational and environmental impact considerations, Alternative 1A (all improvement concepts except Peak Period Pricing) was selected as the Preferred Alternative.[32] The basis for this selection is detailed in Chapter 8 and other relevant sections of the Draft EIS/EIR. Further analysis of the Preferred Alternative is also set out in the Supplemental DEIS/FEIR and in this Final EIS. Based upon this analysis, the Proposed Action relates to the approval and implementation of the Preferred Alternative, which consists of the following specific components:

- Construction of a unidirectional Runway 14/32;
- Construction of a Centerfield Taxiway;
- Extension of Taxiway Delta;
- Realignment of Taxiway November;
- Reconfiguration of the taxiway layout in the Southwest Corner of the airfield; and
- Reduction in approach minimums on Runways 22L, 27, 15R, and 33L.

Following completion of the Supplemental DEIS/FEIR, Massport made the commitment as part of the Massachusetts Environmental Policy Act (MEPA) process to implement Peak Period Pricing or an alternative demand management technique as a mitigation measure for the Preferred Alternative. This commitment is also set out as a mitigation commitment in this Final EIS (see Chapter 4). While Peak Period Pricing is expected to yield delay reduction benefits under certain possible future circumstances, it does not eliminate the need to implement the Preferred Alternative, which addresses different causes of existing delay.

Each of the components of the Preferred Alternative, as set forth in this Final EIS, is illustrated in Figure 1.8-1 and is discussed in more detail in the paragraphs that follow.

1.8.1 Unidirectional Runway 14/32

Unidirectional Runway 14/32 would be 5,000 feet in length, with additional 1,000 foot paved safety areas at each end. The runway would be located along the southwestern

32 Inherent in these improvements is the establishment or modification of air traffic control procedures and attendant airport navigational aids.

edge of the Airport, as shown in Figure 1.8-1. All arrivals would be from the southeast over Boston Harbor and would touch down at the Runway 32 end and taxi toward the Runway 14 end. All departures would leave from the Runway 14 end, with jets climbing out and heading southeast over the harbor.

Runway 14/32 would be operated as an IFR (Instrument Flight Rules)[33] runway. The FAA believes that approach minimums as low as 400 feet and a visibility of ¾ miles are reasonably foreseeable in the long-term with GPS approaches. While most of the delay reduction benefit from unidirectional Runway 14/32 comes from its use in VFR (Visual Flight Rules) conditions, instrumentation will enhance safety by providing positive guidance to aircraft during visual as well as non-visual conditions.

The primary benefit of Runway 14/32 occurs during northwest wind conditions, when available airfield capacity declines as operations shift from Logan's normal three-runway configurations to lower-capacity configurations using Runways 33L and 27 or Runway 33L alone. With Runway 14/32, air traffic controllers can prevent the drop in capacity that currently occurs under northwest wind conditions, thereby reducing delays. Controllers also have the opportunity to use the additional three-runway configurations with Runway 14/32 to shift runway utilization patterns at Logan. While these predicted shifts in runway utilization are consistent with the goals of Logan's Preferential Runway Advisory System (PRAS), Massport, with support from the FAA, has committed to begin working with the CAC to reassess the PRAS program as part of its Section 61 Findings (see Section 4.2).

Given that PRAS is being reassessed, this EIS further examines a wind restriction on Runway 14/32 as a mitigation measure to prevent major shifts in runway utilization. The FAA is proposing a 10-knot wind restriction on the use of Runway 14/32 as a mitigation measure for the Preferred Alternative to prevent shifts in runway utilization. This restriction will limit the use of Runway 14/32 to those times when winds are from the northwest or southeast quadrant at a speed of 10 knots or greater. Section 3.8.6 of this Final EIS demonstrates that with such a restriction in place, Runway 14/32 provides substantial delay reduction benefits but does not materially change runway utilization when compared to CY 2000 runway end use. Since PRAS will be reassessed, any recommendation concerning a wind restriction that might result from the updated PRAS would be subject to appropriate environmental review. The wind restriction mitigation commitment is described in detail in Section 4.1.2 of this Final EIS.

1.8.2 Taxiway Improvements

Four taxiway improvements are proposed in the Airside Project EIS. The taxiway improvements would improve Logan's airside efficiency and enhance airfield safety. Each proposed taxiway would be 100 feet wide with two 35-foot paved shoulders.

33 Instrument Flight Rules (IFR) are rules for flights permitted to penetrate clouds and low visibility conditions by reference to cockpit flight instruments and radio navigation. Instrument flight rules apply when visual meteorological conditions do not exist (i.e., bad weather conditions when the ceiling is less than 1,000 feet or visibility is less than 3 miles).

1.8.2.1 Centerfield Taxiway

This EIS evaluates a proposal to construct a new 9,300-foot Centerfield Taxiway that would be located between Runways 4L/22R and 4R/22L, as shown in Figure 1.8-1.[34] The purpose of the Centerfield Taxiway is to provide alternative taxi routings for more efficient movement of aircraft between runways and terminal areas. Improved taxi routes would reduce ground delays for both arriving and departing aircraft. By diminishing delays, particularly north of Runway 15R/33L, the Centerfield Taxiway would contribute to small reductions in the ground noise and air quality impacts associated with ground taxi operations.

In general, a Centerfield Taxiway would decrease taxiing distances and taxiing times for most airfield operating configurations, and would move points of congestion away from residential areas. The Centerfield Taxiway would reduce the potential for runway incursions, would enhance safety by decreasing congestion on the taxiway system, and would provide controllers with greater flexibility to improve the efficiency of airport ground operations. Section 3.9 of this Final EIS provides more detail on the operation of the Centerfield Taxiway and additional information regarding its associated safety enhancements.

The EIS demonstrates that the Centerfield Taxiway would enhance airfield safety and increase efficiency, provide small air quality benefits, and have no significant adverse noise or other environmental impact, as defined by FAA Orders implementing NEPA. Notwithstanding this analysis, residents of the communities closest to the northern end of Logan have expressed concerns about the potential impacts of the Centerfield Taxiway. To address these community concerns, the FAA is proposing to conduct an additional study to evaluate potential beneficial operational procedures that would preserve or improve the operational and other environmental benefits of the Centerfield Taxiway. This taxiway study would be coordinated with representatives from the communities closest to the ends of Runways 22L and 22R and adjacent to the northern end of the airfield. The FAA would defer any decision concerning the Centerfield Taxiway until after the taxiway study was completed. Sections 3.10 and 4.2 provide more information about this proposed study.

34 A Centerfield Taxiway, positioned between Runways 4L/22R and 4R/22L, was initially proposed in 1990 as part of Massport's annual airfield improvements program. An Environmental Notification Form (ENF) was filed for that program and the Secretary of the Executive Office of Environmental Affairs (EOEA) issued a Scope for a Draft EIR, pursuant to MEPA. Massport later withdrew that project (EOEA No. 8108). The layout of the Centerfield Taxiway concept as proposed in the Supplemental Draft EIS/FEIR differs from the 1990 proposal in that the current proposal extends south to Taxiway Bravo to incorporate reconfiguration of the Southwest Corner taxiway system (Refer to Section 3.3.2 of the Supplemental DEIS/FEIR). The earlier concept terminated at Taxiway Whiskey.

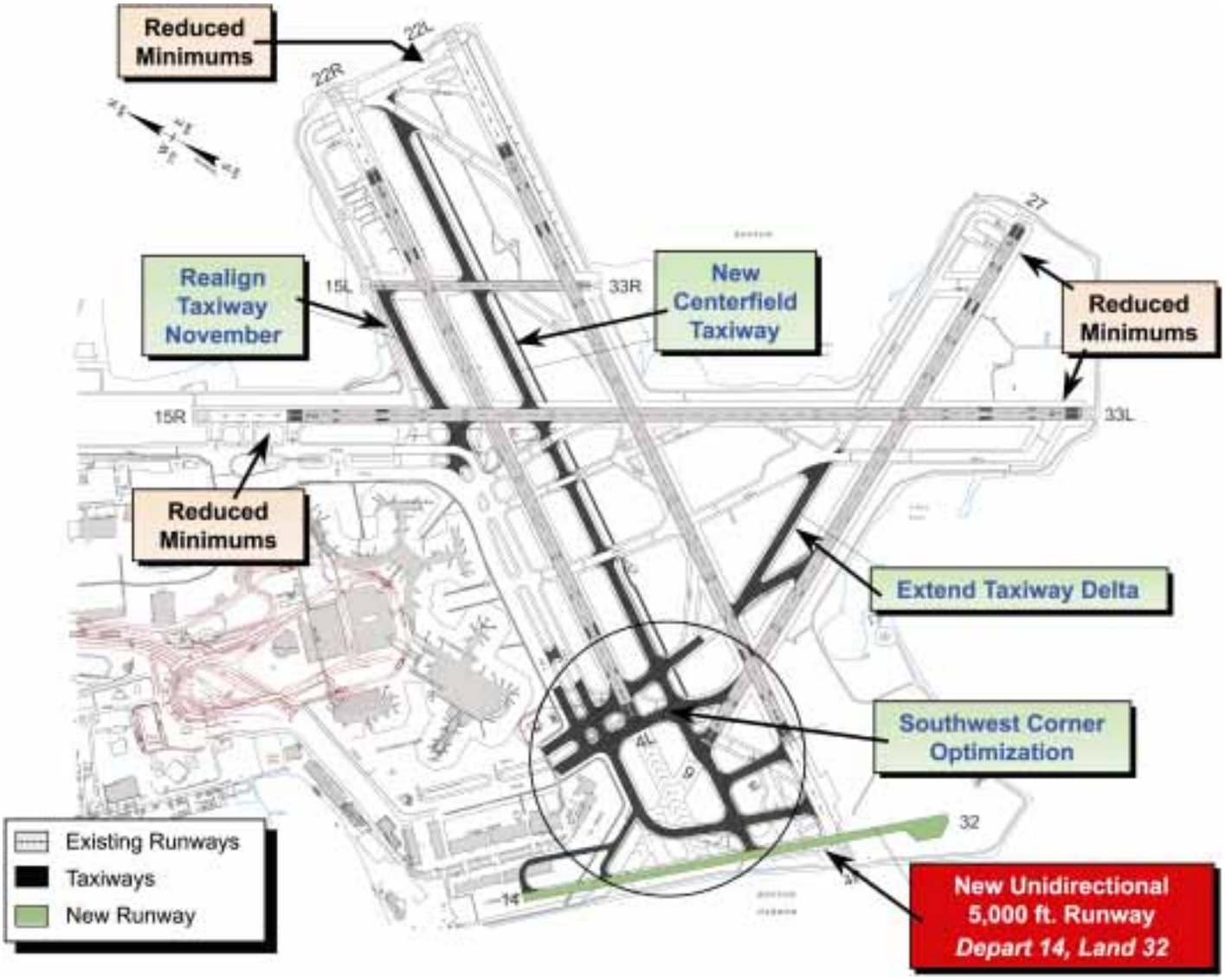


Figure 1.8-1
Preferred Alternative

7676-FIG-1.8-1.p65

1.8.2.2 Taxiway Delta Extension

Taxiway Delta would be extended 2,000 feet between Taxiway Charlie and Runway 4R/22L, as shown in Figure 1.8-1. The completion of Taxiway Delta would provide an alternate path for departures on Runways 27 and 33L, thereby reducing congestion on Taxiway Charlie, which is now the sole access to these runways. This would improve efficiency by separating jets taxiing to Runways 27 and 33L from non-jets using Taxiways Charlie and Golf for Runway 33L intersection departures. By segmenting these taxi flows and providing straight taxiway paths to the ends of Runways 27 and 33L, the Taxiway Delta extension will enhance safety by reducing the potential for pilot confusion.

1.8.2.3 Taxiway November Realignment

As shown in Figure 1.8-1, approximately 2,200 feet of Taxiway November would be realigned between Runway 15L/33R and Runway 15R/33L to simplify its connection to Taxiways Kilo and Alpha, which provide the main flow around the terminal areas. In addition, this improvement would eliminate the confusing simultaneous intersection of Taxiway Tango with both Runways 33L and 22R. These changes would not only improve efficiency but also would enhance safety by reducing the potential for runway incursions, especially at night and during reduced visibility.

1.8.2.4 Southwest Corner Taxiway System Reconfiguration

Changes to the taxi layout in the Southwest Corner of the Airport near the ends of Runways 4L, 4R and 9 would simplify taxiway layout, reduce the opportunities for runway incursions, and expedite ground movements in this area. Reconfiguring the existing taxiways would improve the access of departures to Runways 4L, 4R and 9, and would provide a more logical and streamlined flow for inbound and outbound aircraft when Runways 27 and 33L are active.

The Southwest Corner reconfiguration, shown in Figure 1.8-1, would enhance safety and operating efficiency by simplifying runway crossings and access in a section of the airfield that may be confusing to some pilots, particularly at night or during reduced visibility. It would also provide the opportunity for unidirectional Runway 14/32 to be used as a taxiway in some runway configurations to improve flexibility and ground movement efficiency.

1.8.3 Reduced Approach Minimums for Runways 15R, 22L, 27, and 33L

The current approach minimums on four existing runways at Logan would be reduced, consistent with most other airports in the nation. The "approach minimum" is the lowest point along the existing glide slope during the approach (landing) at which the pilot must make a decision whether to land or to execute a missed approach procedure, when the visibility is low. The approach minimum for each runway is established by the FAA based upon the type of navigation equipment available, the existence of obstacles in the approach area, and performance of the aircraft. The approach minimums are established

and published for each runway by the FAA. Lowering the minimums would not change the altitudes at which aircraft operate, but only the distance from the runway where the missed-approach decision is made.

Five of Logan's runway ends are equipped with precision Instrument Landing Systems (ILS) and approach lighting systems, which enable aircraft to land under low visibility weather conditions. At the present time, only Runway 4R, which is equipped with a Category III ILS, is approved for the lowest approach minimum established by FAA. This adds to greater use of and dependence on Runway 4R under poor weather conditions. This section summarizes proposed changes to the approach minimums at the other four runways, which are described in detail in Section 3.4 of the Airside Project Draft EIS/EIR.

Although Runways 15R, 22L, 27 and 33L are each equipped with a precision Category I ILS, those on Runways 22L and 27 currently have approach minimums that are artificially constrained and are significantly higher than the capabilities of the existing electronic equipment permit. When the ILSs were installed on Runways 22L, 27 and 15R several years ago, the FAA agreed to retain the existing non-precision approach minimums until the appropriate new values could be addressed in an EIS. The existing and proposed ultimate ILS minimums are shown in Table 1.8-1.

The existing ILS approaches to Runways 15R and 33L are also proposed to be improved. The proposed action includes upgrading these approaches to Category III ILSs, which would permit landings on these runways down to the same approach minimums as on Runway 4R. The availability of additional precision navigation equipment on these two runways would provide improved operational flexibility to air traffic controllers and enhance safety during adverse weather conditions.

Lowered minimums on these four runways would extend the range of weather conditions under which they could be used and would thereby reduce reliance on Runway 4R during low visibility. This would provide improved operational flexibility and thereby reduce delays, as well as increase the opportunity to achieve PRAS goals, particularly relating to short-term dwell and persistence.

Table 1.8-1 shows the change in availability of each runway due to reduced minimums. An analysis of the 37.5M Low Fleet demonstrated that reduced minimums alone provide an annual delay reduction of approximately 6,000 hours as a result of greater runway availability under poor weather conditions. Appendix D of the Airside Project Draft EIS/EIR provides additional discussion of reduced minimums and their associated delay benefits.

Table 1.8-1
Existing and Proposed ILS Minimums[1] for Runways 15R, 22L, 27, and 33L

Runway		Ceiling		Visibility	Distance of Decision Height Point from Touchdown[2]	Runway Availability
		Feet Above Ground Level	Mean Sea Level Elevation (feet)	Statute (Miles)	Feet	Annual Hours, 1980 – 1990 Weather
15R	Existing	250	268	¾	4,800	5,356
	Proposed	0	18	⅛	0	5,495
22L	Existing	403	420	1¼	7,700	6,835
	Proposed	200	217	½	3,800	6,929
27	Existing	443	460	1½	8,500	6,972
	Proposed	200	217	½	3,800	7,055
33L	Existing	200	217	½	3,800	7,173
	Proposed	0	17	⅛	0	7,249

1 Lowest minimums possible. Some may be gradually achieved over time.
2 These are graphically represented in Appendix D of the Airside Project Draft EIS/EIR.

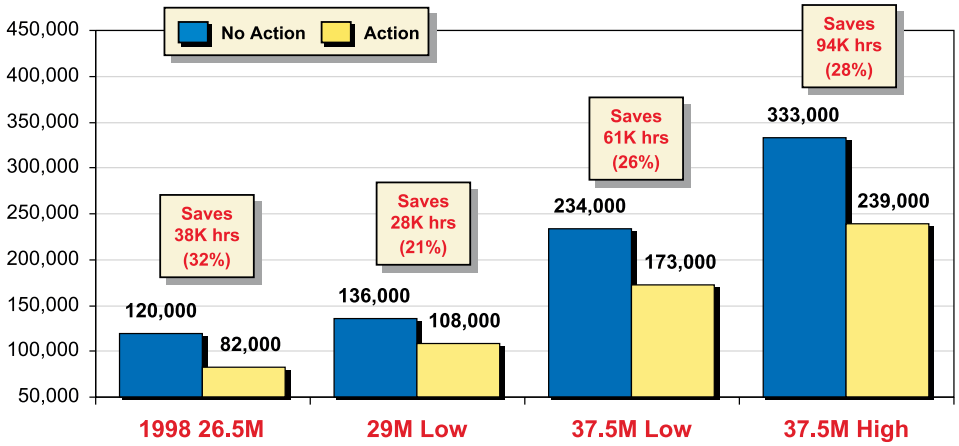
1.9 Delay Modeling Results

State-of-the-art airfield simulation models were used to quantify the levels of delay at Logan under past, recent, and anticipated future operating conditions. For each forecast scenario, the appropriate baseline analysis is the No Action Alternative (Alternative 4). The operational and environmental benefits and impacts of the Preferred Alternative are evaluated by comparing the results of the Preferred Alternative to the No Action Alternative. Chapter 2 describes the environmental benefits and impacts of the Preferred Alternative. The environmental impacts of a wind restriction on Runway 14/32 are presented in Section 3.8, while the environmental impacts of the Centerfield Taxiway are specified in Section 3.10.

If no action is taken to improve the operating efficiency of the Logan airfield, annual runway-related delays could grow from approximately 120,000 hours in 1998 to as high as 333,000 hours under the long-term 37.5M High Fleet scenario (see Figure 1.9-1). With no improvements, average delays could rise from 14 minutes to 33 minutes per flight. Alternatively, implementing the Preferred Alternative would have reduced 1998 delays by 32 percent (or 38,000 annual hours). As demand grows in the future, the Preferred Alternative would reduce future Logan runway delays by as much as 21 percent in the 29M Low Fleet and by up to 28 percent in the 37.5M High Fleet, while significantly

reducing delays during northwest wind conditions. Even with a 10-knot wind restriction on Runway 14/32, the Preferred Alternative still produces substantial delay reduction benefits. (See Section 3.8.6.)

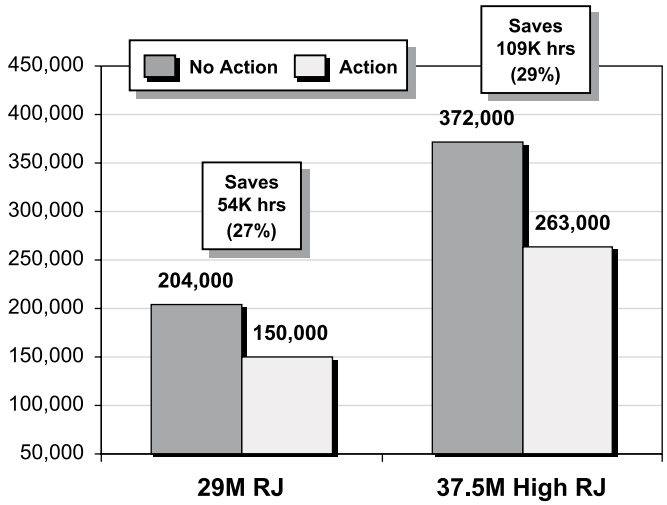
Figure 1.9-1
Annual Hours of Runway-Related Delay Reduction — Preferred Alternative (Action) vs. No Action for Draft EIS/EIR Fleets



In light of the recent growth in RJ activity, the delay reduction benefits of the Preferred Alternative under a long-term 37.5M High RJ Fleet were analyzed in the Supplemental DEIS/FEIR. The delay modeling performed for this fleet incorporated RJ utilization assumptions for the proposed 5,000-foot runway developed from an independent FAA analysis. Using these conservative assumptions, the Preferred Alternative would reduce annual runway delays by 109,000 hours or 29 percent, compared to the No Action Alternative (See Figure 1.9-2). With a 10-knot wind restriction, the Preferred Alternative would reduce runway delays by 89,000 annual hours compared to the 37.5M High RJ No Action Alternative (see Section 3.8.5).

In this Final EIS, an additional fleet—the 29M RJ Fleet—was also assessed to evaluate the impacts of the Preferred Alternative under a near-term fleet with a significant number of regional jet aircraft. Under the 29M RJ Fleet, the Preferred Alternative would reduce projected runway delays by as much as 54,000 annual hours or 27 percent compared to the No Action Alternative (See Figure 1.9-2). These analyses demonstrate the consistent utility of the proposed runway, even under scenarios with high regional jet activity.

Figure 1.9-2
Annual Hours of Runway-Related Delay Reduction — Preferred Alternative (Action) vs. No Action for Supplemental DEIS/FEIR and Final EIS Regional Jet Fleets



Demand management will likely be in place in the long-term high demand scenarios. A comparison between the No Build or Demand Management Alternative (Alternative 3) and the All Improvements Alternative (Alternative 1) allows determination of the incremental delay reduction benefits of Runway 14/32 after demand management is in place. Table 1.9-1 presents the annual hours of runway-related delay associated with each fleet scenario and improvement alternative.

If no action is taken to improve the operating efficiency of the Logan airfield, annual runway-related delays could grow from approximately 120,000 hours in 1998 to a level two to three times higher under the long-term scenarios, absent any actions by airlines, Massport, or the FAA to manage demand. Alternatively, implementing the Preferred Alternative would reduce future Logan runway delays by as much as 21 to 29 percent (or 28,000 to 109,000 hours), significantly reducing delays during northwest wind conditions through the use of Runway 14/32. Assuming that demand management measures were already in place to address high levels of baseline delays, Runway 14/32 would still reduce annual delays by as much as 18 to 28 percent (or 26,000 to 85,000 hours) under the high demand scenarios. This point is illustrated in Figure 1.9-3, which presents the delay reduction benefits of Runway 14/32 under the 37.5M High RJ scenario. Even with demand management in place, Runway 14/32 reduces delays by an additional 28 percent, or 85,000 hours.

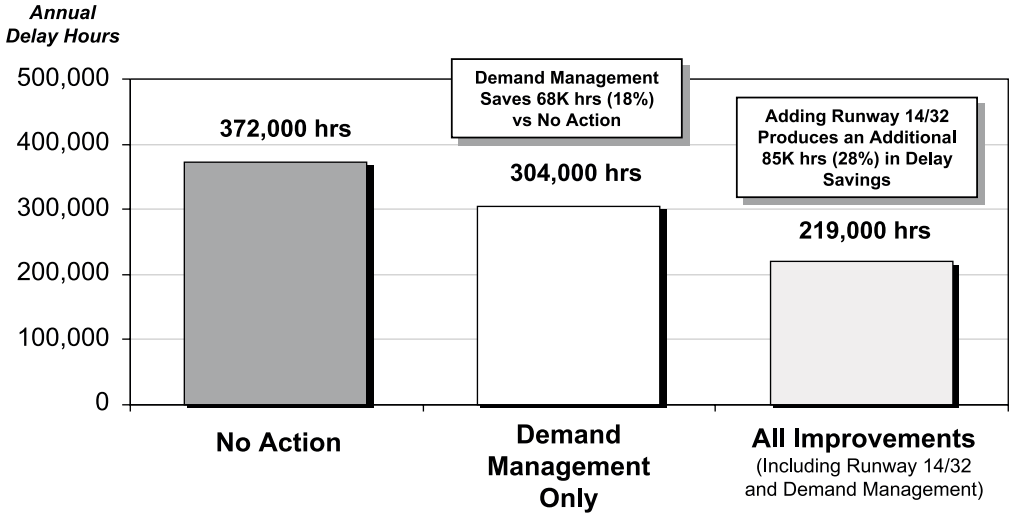
Table 1.9-1
Airside EIS Delay Reduction Benefits by Fleet Scenario

		29M Psgrs			37.5M Psgrs		
	1998	Low	RJ	High	Low	High RJ	High
Annual Hours of Runway-Related Delay (000)							
Alternative 1: All Improvements	na	105	na	122	162	219	159
Alternative 1A: Preferred Alternative	82	108	150	144	173	263	239
Alternative 3: Demand Management Only*	na	125	na	148	208	304	194
Alternative 4: No Action	120	136	204	190	234	372	333
Annual Hours of Delay Reduction (000)							
Preferred Alternative Only: 1A vs. 4	38	28	54	46	61	109	94
Demand Management Only: 3 vs. 4*	na	11	na	42	26	68	139
14/32 After Demand Management: 1 vs. 3	na	20	na	26	46	85	35
Percent Delay Reduction							
Preferred Alternative Only: 1A vs. 4	32%	21%	26%	24%	26%	29%	28%
Demand Management Only: 3 vs. 4*	na	8%	na	22%	11%	18%	42%
14/32 After Demand Management: 1 vs. 3	na	16%	na	18%	22%	28%	18%

* The Demand Management Only or No Build Alternative includes the Reduced Minimums and their delay reduction benefits. Alternative 3: Demand Management Only and Alternative 2: All Actions Except Runway 14/32 have identical runway-related delay hours.

Note: 1998 weather used for 1998 analysis, 1997-1999 weather used for 29M RJ and 37.5M High RJ Analysis. All other analyses used 1981-1990 weather conditions.

Figure 1.9-3
Delay Reduction Benefits of Runway 14/32 for the 37.5M High RJ Fleet - Annual Delay Hours for Various Alternatives



The EIS analysis indicates that demand management would provide significant benefits in the long-term when airline overscheduling exists, but would not be an effective near-term solution to Logan's delay problem. In contrast, Runway 14/32 reduces delays due to northwest winds under historic, current and future scenarios, and its delay reduction benefits are not dependent upon long-term growth in operations. In addition, Runway 14/32 produces significant delay reduction benefits even with demand management in place under the future scenarios where such a program would be justified.

1.10 Status of Permits Required

The Massachusetts Historical Commission has concurred with the FAA that the Preferred Alternative would have no adverse effect on historic properties. Also, in June 2001, the Secretary of the Massachusetts Executive Office of Environmental Affairs (EOEA) issued a Certificate determining that the Final EIR adequately and properly complies with MEPA and its implementing regulations, concluding the state MEPA review of the Airside Project. Appendix E contains correspondence from the Massachusetts Office of Coastal Zone Management regarding their view of the consistency determination, stating their belief that the Preferred Alternative is consistent with the Massachusetts coastal zone management program. Additional agency reviews, permits, approvals, and notices shown in Table 1.10-1 may be required for the implementation of the Preferred Alternative.

Table 1.10-1
Project Permits, Approvals,[1] and Review Actions for the Airside Project

Agency Name	Permit or Action
Principle Project Permits, Approvals and Review Actions	
Federal Aviation Administration	■ Airport Layout Plan (ALP) approval ■ National Environmental Policy Act (NEPA), Record of Decision ■ Notice of Proposed Landing Area Construction or Alteration (14 CFR, Part 171)
Massachusetts Executive Office of Environmental Affairs	■ Massachusetts Environmental Policy Act (MEPA) Certification [2]
Massachusetts Coastal Zone Management	■ Federal Consistency Review of FAA Determination [3]
Massachusetts Historical Commission	■ Section 106 Review of FAA Determination [4]
Commonwealth of Massachusetts, Department of Environmental Protection	■ Air Quality Certification ■ Water Quality Certification
U.S. Fish and Wildlife Service	■ Endangered Species Coordination [5]
Construction Related Permits or Approvals	
Environmental Protection Agency	■ National Pollution Discharge Elimination System, Stormwater Discharge (Construction Activity) [6]
Massachusetts Department of Environmental Protection, Division of Air Quality Massachusetts Department of Labor and Industries; and United States Environmental Protection Agency	■ Notice Concerning Commencement of Construction or Demolition
Massachusetts Natural Heritage and Endangered Species Program	■ Conservation and Management Permit
City of Boston, Conservation Commission	■ Order of Conditions
Federal Funding Approvals	
Governor of Commonwealth of Massachusetts	■ Air and Water Quality Certification

1 Not all permits or approvals may be required.
2 The MEPA process has been successfully concluded.
3 The Massachusetts Office of Coastal Zone Management has concurred with the FAA that the Preferred Alternative is consistent with the policies and goals of the state CZM Plan.
4 The Massachusetts Historical Commission has concurred that the Preferred Alternative would have no adverse effect on historic properties.
5 Concluded as documented in the Draft EIS/EIR.
6 Logan Airport NPDES Permit (No. MA0000787) covers airport-wide activities.

1.11 Conclusion

By every available measure of delay, Logan has a serious delay problem. In 2000, Logan was the 6th most delayed airport in the United States based on FAA OPSNET statistics, yet it ranked 11th in terms of total aircraft operations. FAA data indicate that Logan's record for arrivals is even worse, ranking as the 2nd most arrival-delayed airport in the nation.

Logan generally operates on three-runway configurations that can accommodate approximately 120 aircraft operations per hour. Most Logan delays occur when wind or weather conditions require all aircraft arrivals and departures to be accommodated on two or fewer runways, producing a substantial decline in airfield operating capacity, or when poor weather requires increased separation distances between aircraft.

Over time, growth in the Boston and regional economies will continue to stimulate increasing demand for air transportation services at Logan. The challenge faced by the FAA and Massport is to safely and efficiently accommodate current and future levels of demand in an environmentally responsible manner, given the existing physical and operational constraints at Logan.

The Preferred Alternative includes construction of unidirectional Runway 14/32, which would correct an underlying limitation of the Logan airfield—the lack of a third available runway in the northwest/southeast operating direction—and provide the opportunity for normal operational capacity to be maintained during northwest wind conditions. With construction of unidirectional Runway 14/32, the Preferred Alternative will address the most preventable cause of serious delays at Logan. Delay, as well as safety, will be addressed by the additional elements of the Preferred Alternative, the taxiway improvements and the reduction in approach minimums on Runways 15R, 22L, 27, and 33L.

Given that PRAS will be reassessed, this EIS further examines a wind restriction on Runway 14/32 as a mitigation measure to prevent major shifts in runway utilization that would otherwise occur with the current PRAS and an unrestricted Runway 14/32. Any recommendation concerning a wind restriction that might result from the updated PRAS would be subject to appropriate environmental review.

Although the EIS analysis demonstrates that the Centerfield Taxiway has environmental benefits and does not adversely impact noise or air quality in the communities surrounding the northern ends of Runways 22L and 22R, residents of these communities have expressed concerns about the impacts of the Centerfield Taxiway. Given these concerns, FAA is proposing to conduct an additional study of taxiway operations in the northern portion of the airfield to evaluate potential beneficial operational procedures that would preserve or improve the operational and environmental benefits of the Centerfield Taxiway. The FAA would not make any decision concerning the Centerfield Taxiway until after the study and appropriate environmental review were completed.